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1898

ATLAS

ASPEN DISTRICT, COLORADO

BY

J. E. SPURR

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR.

ATLAS

TO ACCOMPANY MONOGRAPH XXXI

ON THE

GEOLOGY

OF THE

ASPEN DISTRICT COLORADO

BY

JOSIAH EDWARD SPURR

SAMUEL FRANKLIN EMMONS, GEOLOGIST IN CHARGE

WASHINGTON 1898.

[illegible]

CONTENTS

	Sheet
Title-page	I
Contents	II
Legend	III
Aspen Atlas Sheet, Topography	IV
Aspen District Sheet, Topography	V
Aspen District Sheet, Geology	VI
Aspen District Sheet, Sections A to G	VII
Aspen Special Sheet, Topography	VIII
Aspen Special Sheet, Geology	IX
Aspen Special Sheet, Sections A to C	X
Tourtelotte Park Special Sheet, Topography	XI
Tourtelotte Park Special Sheet, Geology	XII
Tourtelotte Park Special Sheet, Sections A and D	XIII
Tourtelotte Park Special Sheet, Sections B, C, E, and F	XIV
Tourtelotte Park Special Sheet, Sections G, H, and I	XV
Hunter Park Special Sheet, Topography	XVI
Hunter Park Special Sheet, Geology	XVII
Hunter Park Special Sheet, Sections A to C	XVIII
Lenado Special Sheet, Topography	XIX
Lenado Special Sheet, Geology and Sections A and B	XX
Tourtelotte Park Mining District Sheet, Geology and Topography	XXI
Tourtelotte Park Mining District Sheet, Sections A to C	XXII
Tourtelotte Park Mining District Sheet, Sections D to F	XXIII
Tourtelotte Park Mining District Sheet, Sections G and H	XXIV
Aspen Mountain Sheet, Geology and Topography	XXV
Aspen Mountain Sheet, Sections A to C	XXVI
Smuggler Mountain Sheet, Geology and Topography	XXVII
Smuggler Mountain Sheet, Sections A to D	XXVIII
Aspen Mountain Sheet, Section D, and Smuggler Mountain Sheet, Section E	XXIX
Lenado Mining District Sheet, Geology and Topography and Sections A and B	XXX

LEGEND

Topography

All the topography on the maps of this atlas is based on five maps of the United States Geological Survey: the Aspen Atlas Sheet, prepared from surveys made in 1893 and drawn on a scale of $\frac{1}{62500}$, or very nearly a mile to the inch, and four special maps, drawn on a scale of $\frac{1}{9600}$, or 800 feet to the inch. These four maps are called the Aspen Special, the Tourtelotte Park Special, the Lenado Special, and the Hunter Park Special, and were prepared from surveys made in 1891–93. As the geological work on the district progressed it was found advisable to extend the Lenado Special map, and the added area was surveyed in 1895. The Aspen Atlas Sheet is now published as Sheet IV; the Aspen Special, Tourtelotte Park Special, Hunter Park Special, and Lenado Special, as Sheets VIII, XI, XVI, and XIX, respectively. From the Aspen Atlas Sheet the topography of the Aspen District Sheet, published as Sheet V, was taken. This map is on a scale twice as large as that of the Aspen Atlas Sheet, or essentially half a mile to the inch, and includes the areas covered by the four special 800-foot maps above mentioned. For the most important mining districts maps are published on a scale of 300 feet to the inch. There are four of these, showing the mining districts of Tourtelotte Park, Aspen Mountain, Smuggler Mountain, and Lenado, which are numbered as Sheets XXI, XXV, XXVII, and XXX, respectively. The topography in these 300-foot maps is taken from the 800-foot maps; the mine workings were compiled under the direction of the author of this monograph from original mine maps kindly furnished by the different mine managers.

Geology

All geological maps and sections are approximately correct representations of the facts of nature, and can be made to approach accuracy in proportion to the opportunity given for detail, which is largely governed by the scale used. In these atlas sheets, therefore, where a single area is shown on different maps, whose scales vary from half a mile to the inch to 300 feet to the inch, the attempt is made to introduce in each case about the amount of detail necessary to bring out clearly the salient points in the geology. Thus in the 300-foot maps the Leadville formation is subdivided into the upper limestone and the lower dolomite, and the bedding fault separating them is shown; other faults of comparatively slight displacement are also indicated; and the glacial drift of the valleys is given a separate coloring. In the 800-foot maps the Leadville formation is not subdivided, but is represented by a single color, and the fault separating the subdivisions is omitted, as are also a number of the smaller faults which are shown on the larger-scale maps; but the superficial drift in the valleys is shown. In the Aspen District map, again, much of the detail shown on the 800-foot maps is eliminated; many of the minor faults are omitted and the structure is generalized for the sake of clearness; and on this map the superficial drift of the valleys is omitted and the underlying rock formation is shown as if actually cropping at the surface, thus giving a connected idea of the general geology of the district.

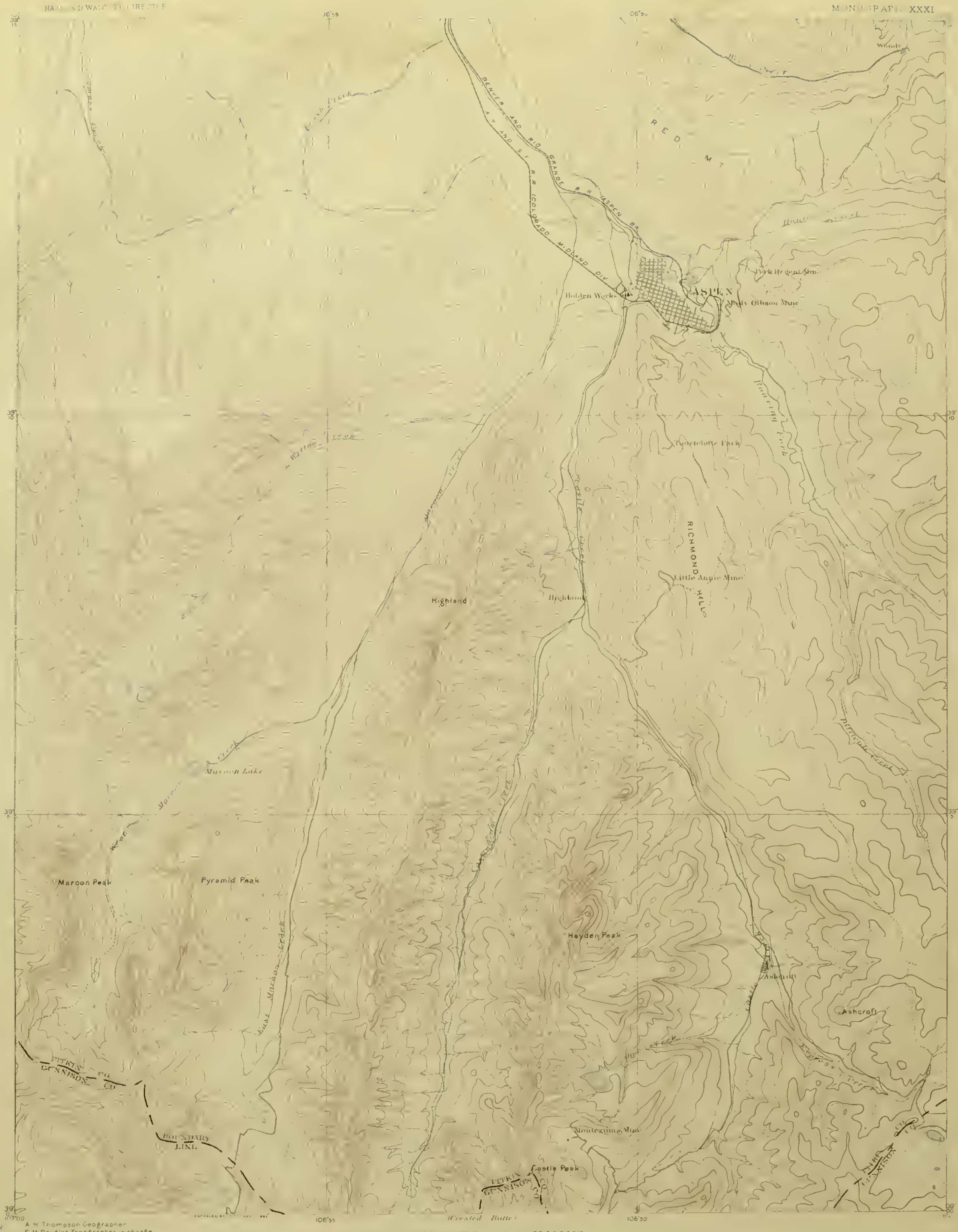
The same suppression of detail in proportion to the scale used is carried out in the sections. All sections are made with the vertical scale the same as the horizontal; and they are always drawn looking toward the north and east.

Full explanations of the maps and sections will be found in the text of the monograph.

U.S. GEOLOGICAL SURVEY
CHARLES D. WALCOTT DIRECTOR

SHEET IV TOPOGRAPHY

MONOGRAPH XXXI



A H Thompson Geographer
F M Douglas Topographer in charge
Triangulation by E M Douglas
Topography by R C Mc Kinney
Surveyed in 1893

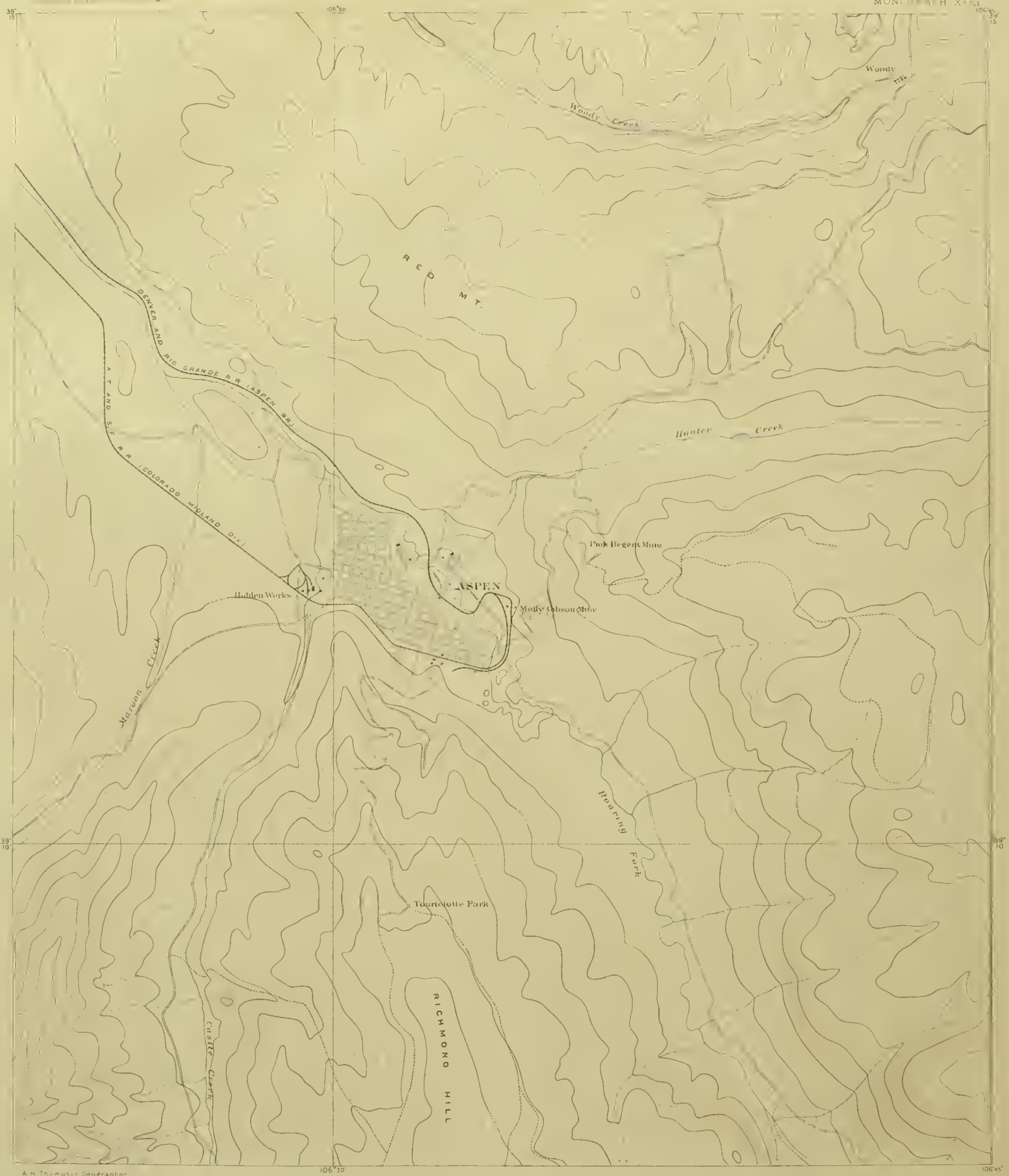
ASPEN ATLAS SHEET

Scale $\frac{1}{62500}$

1 ½ 0 1 2 3 4 Miles

Contour interval 100 feet
Datum is mean Sea level

JULIUS BIEN & CO. LITH. N.Y.



A. H. Thompson Geographer
F. M. Douglas Topographer in charge
Triangulation by E. M. Douglas
Topography by R. C. McKinney
Surveyed in 1893

ASPEN DISTRICT

Scale

1 ½ 0 1 MILE

1 ½ 0 1 KILOMETER

Contour interval 100 feet

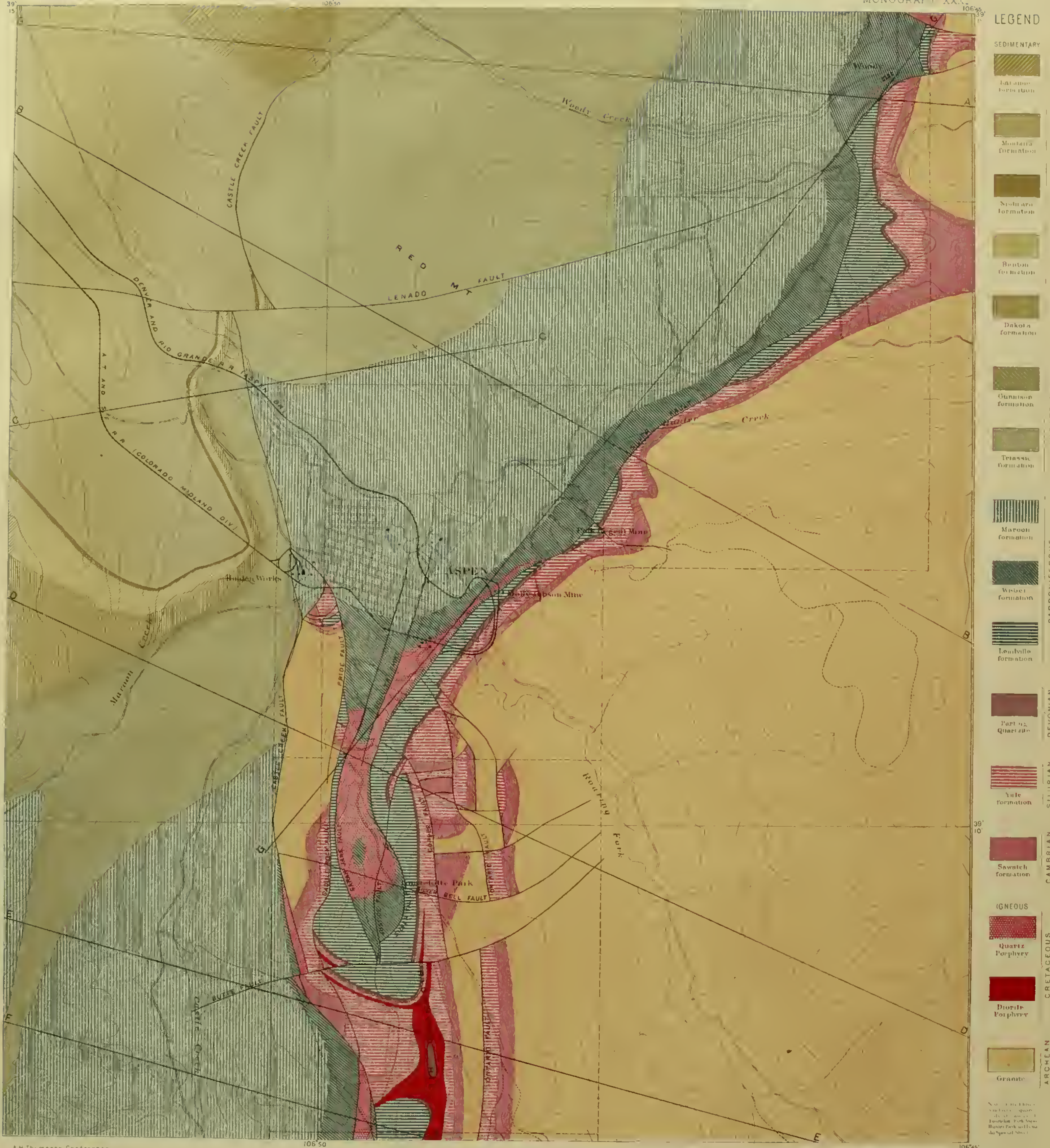
Datum is mean Sea level

JULIUS BIEN & CO. LITH. N.Y.

U.S. GEOLOGICAL SURVEY
CHARLES D. WALCOTT DIRECTOR

GEOLOGY SHEET VI

MONOGRAPH XXXI



A.H. Thompson Geographer
Morris Bien Topographer in charge
Triangulation by Morris Bien
Topography by F.F. Grove
Surveyed in 1891

S.F. Emmons Geologist in charge
Geology by J.E. Spurr
Assistant, G.W. Tower

ASPEN DISTRICT SHEET

Scale

1 MILE

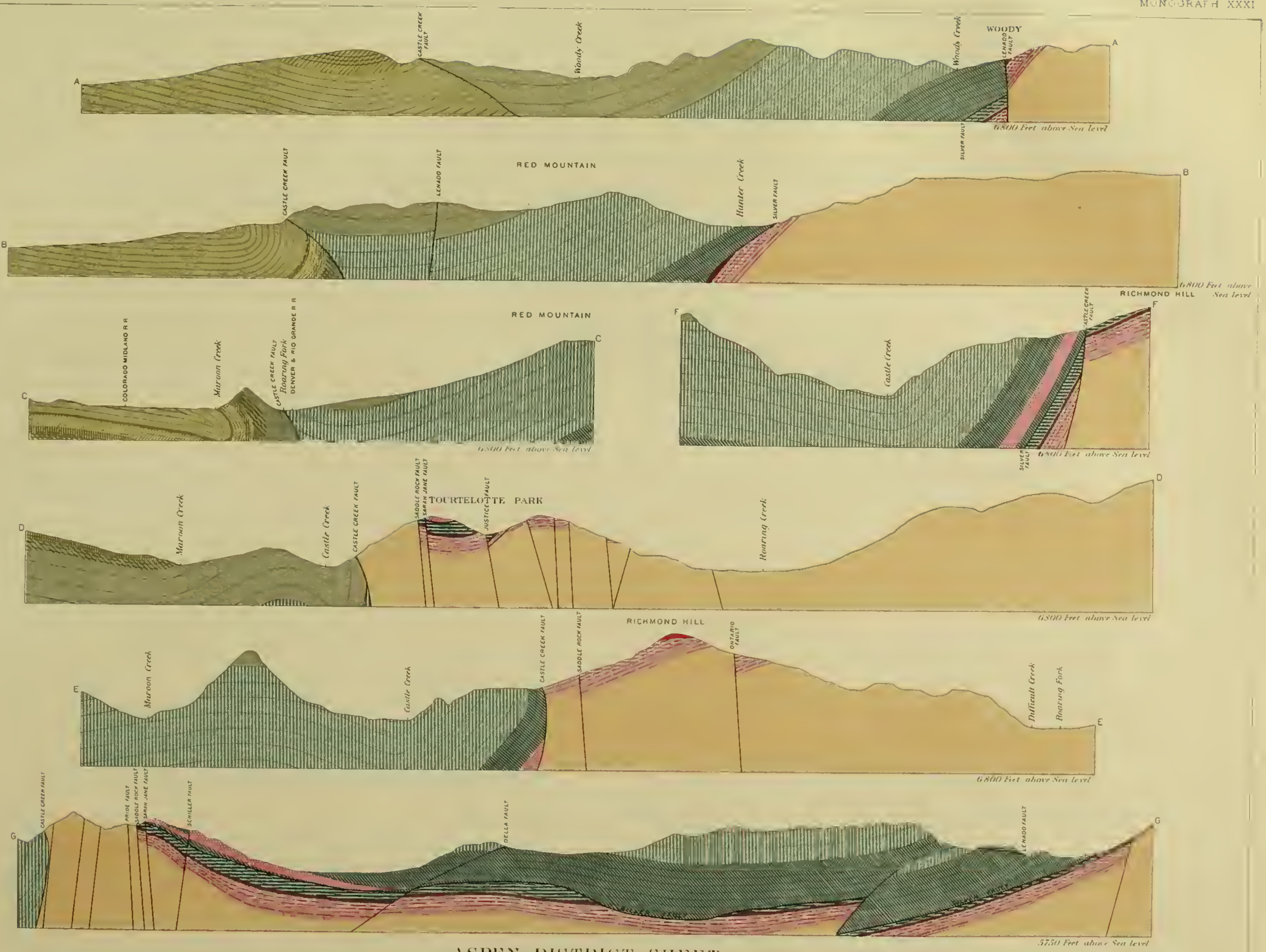
1 KILOMETER

Contour interval 100 feet

Datum is mean Sea level

JULIUS BIEN & CO. LITH. N.Y.

SHEET VII SECTIONS



ASPEN DISTRICT SHEET

LEGEND

SEDIMENTARY

CRETACEOUS
- LARAMIE FORMATION
- MONTANA FORMATION
- NIOBRARA FORMATION
- BENTON FORMATION
- DAKOTA FORMATION

JURATRIAS
- GUNNISON FORMATION
- TRIASSIC FORMATION

CARBONIFEROUS
- MAROON FORMATION
- WEBER FORMATION
- LEADVILLE FORMATION

DEVONIAN
- PARTING QUARTZITE

SILURIAN
- YULE FORMATION

CAMBRIAN
- SAWATCH FORMATION

IGNEOUS

CRETACEOUS
- QUARTZ PORPHYRY
- DIORITE PORPHYRY

ARCHEAN
- GRANITE

Horizontal and vertical Scale

1 ½ 0 1 MILE

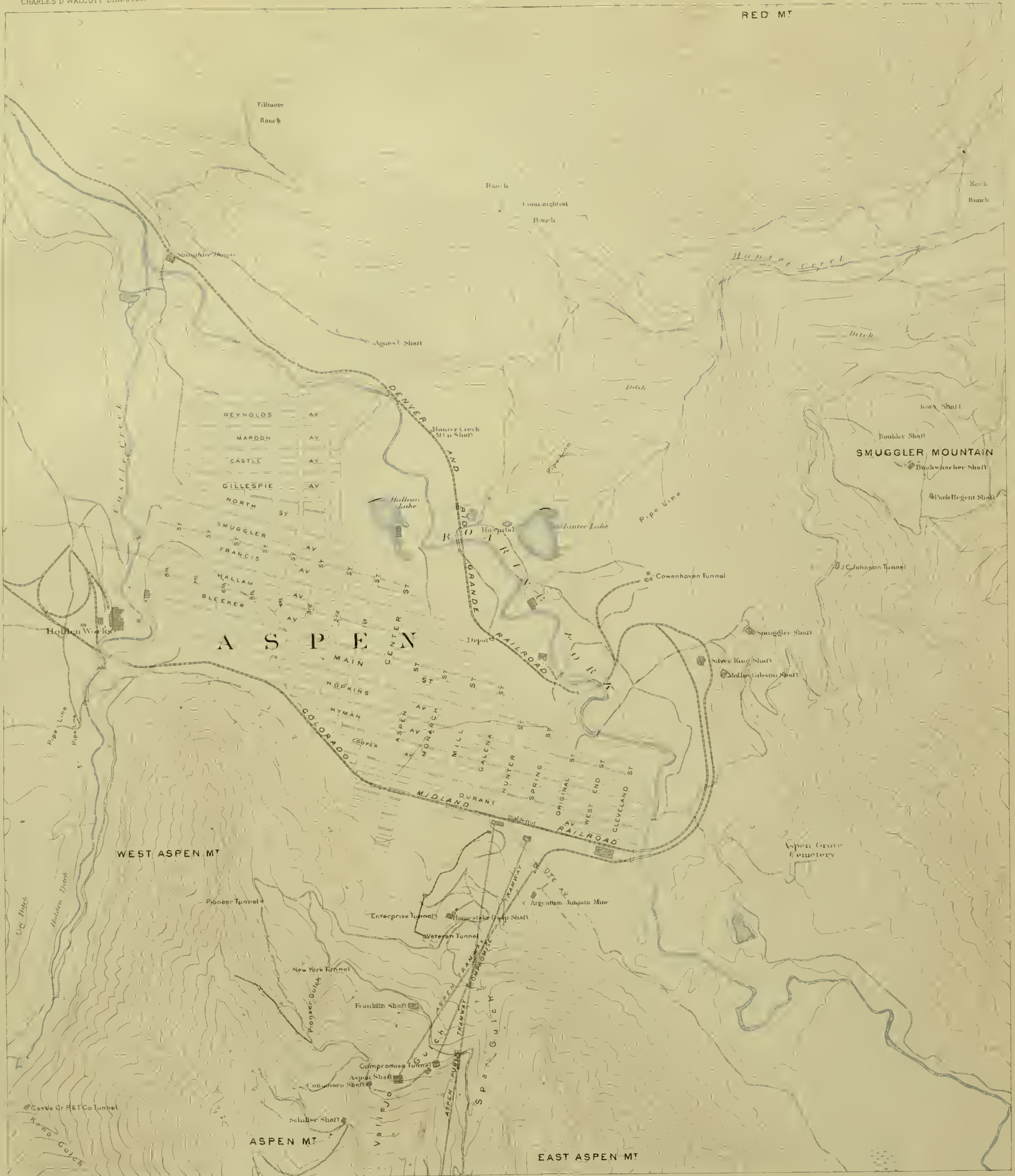
1 ½ 0 1 KILOMETER

JULIUS BIEN & CO. LITH. N.Y.

U S GEOLOGICAL SURVEY
CHARLES D WALCOTT DIRECTOR

SHEET VIII TOPOGRAPHY

MONOGRAPH XXXI



A H Thompson, Geographer
Morris Bien, Topographer in charge
Triangulation by Morris Bien
Topography by F F Grove
Surveyed in 1891

ASPEN SPECIAL

Scale $\frac{1}{9600}$

800 400 0 800 1600 2400 FEET

200 100 0 200 400 600 METRES

Contour interval 25 feet

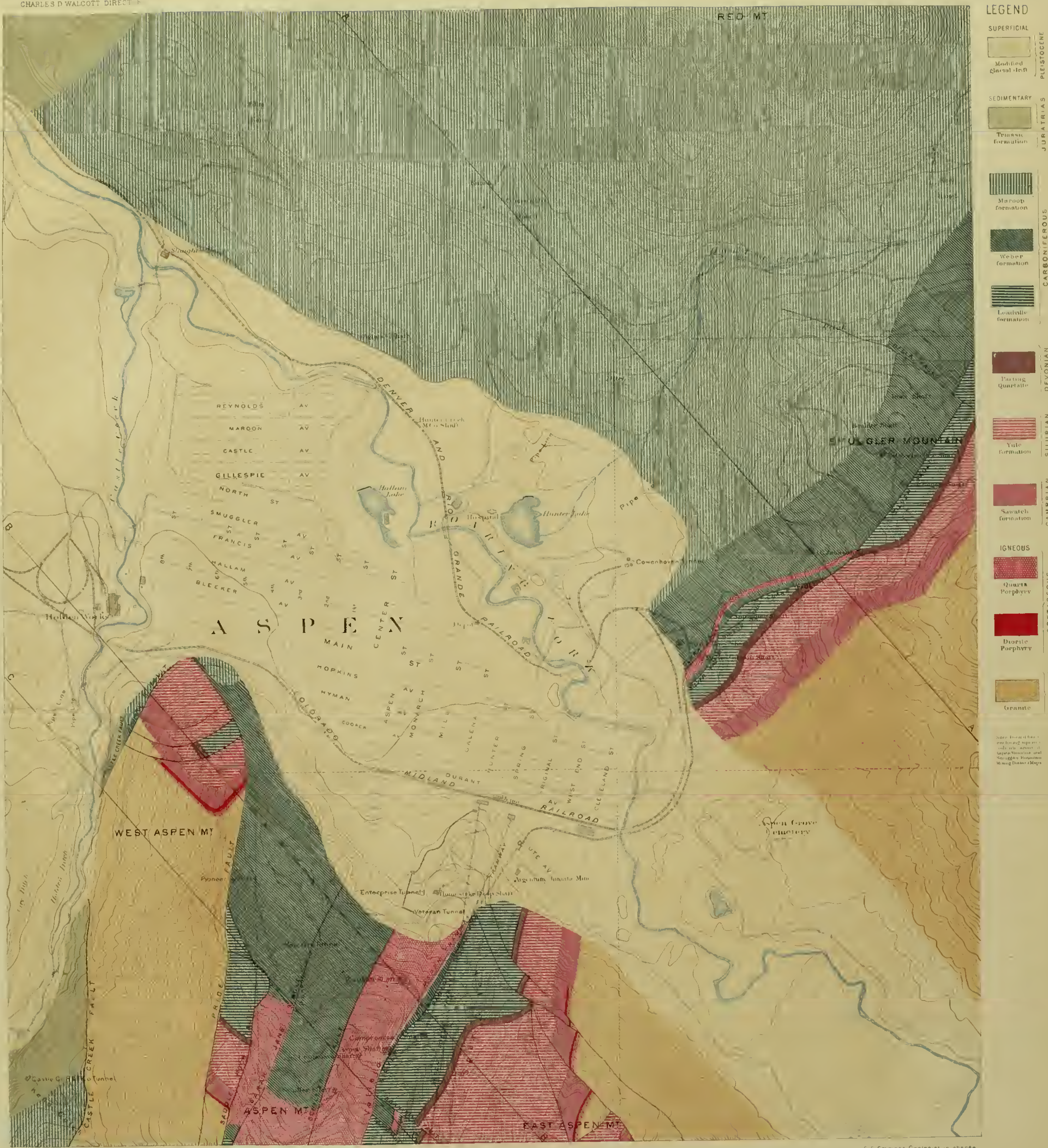
Datum is mean Sea level

JULIUS BIEN & CO LITH N Y

U S GEOLOGICAL SURVE
CHARLES D WALCOTT DIRECT

GEOLOGY SHEET IX

MONOGRAPH XXXI



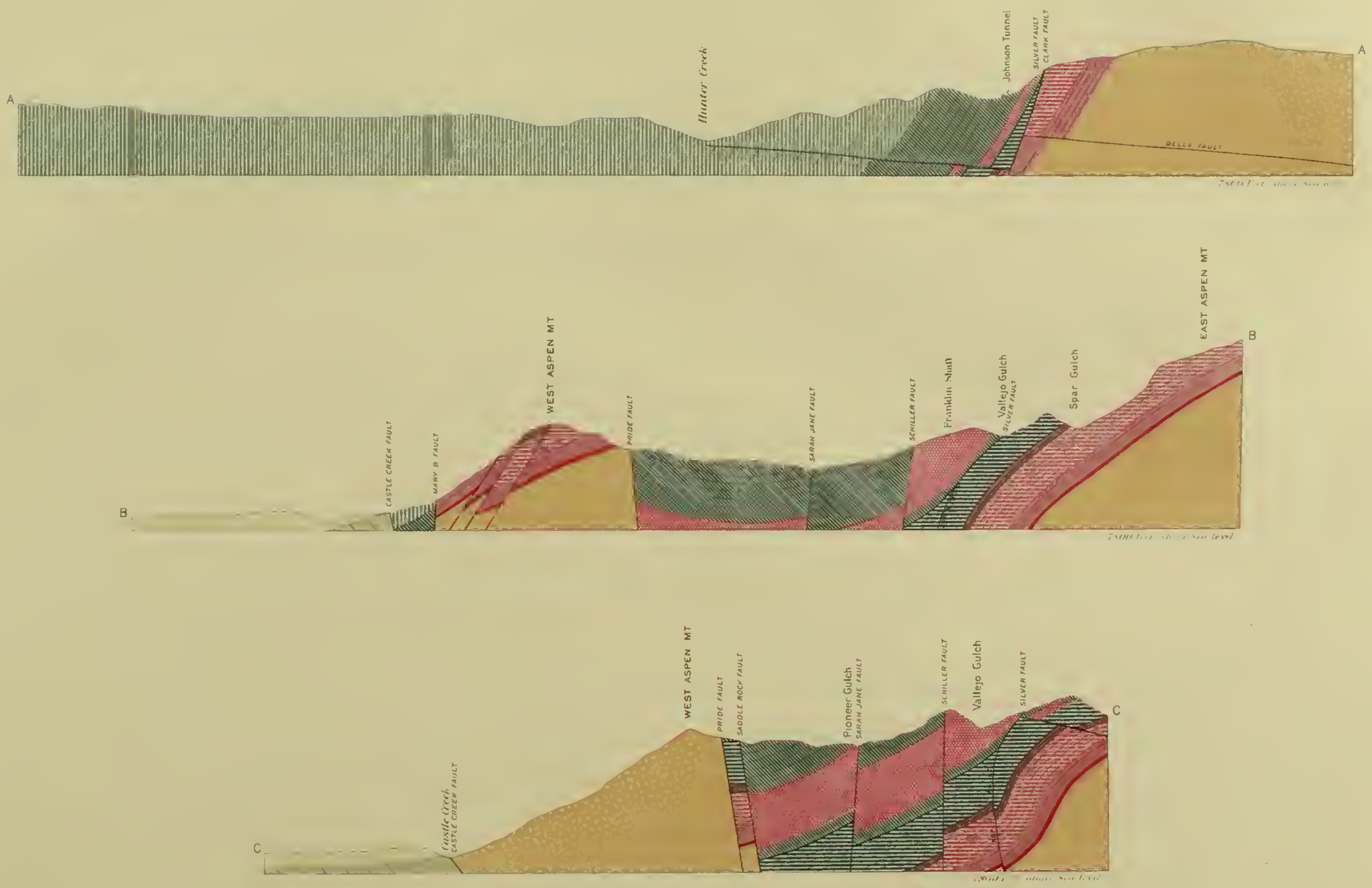
ASPEN SPECIAL SHEET

Scale
Contour interval 25 feet
Datum is mean sea level

JULIUS BIEN & CO LITH N Y

S F Emmons Geologist, in charge
Geology by J E Spurr
Assistant, G W Tower

SHEET X SECTIONS



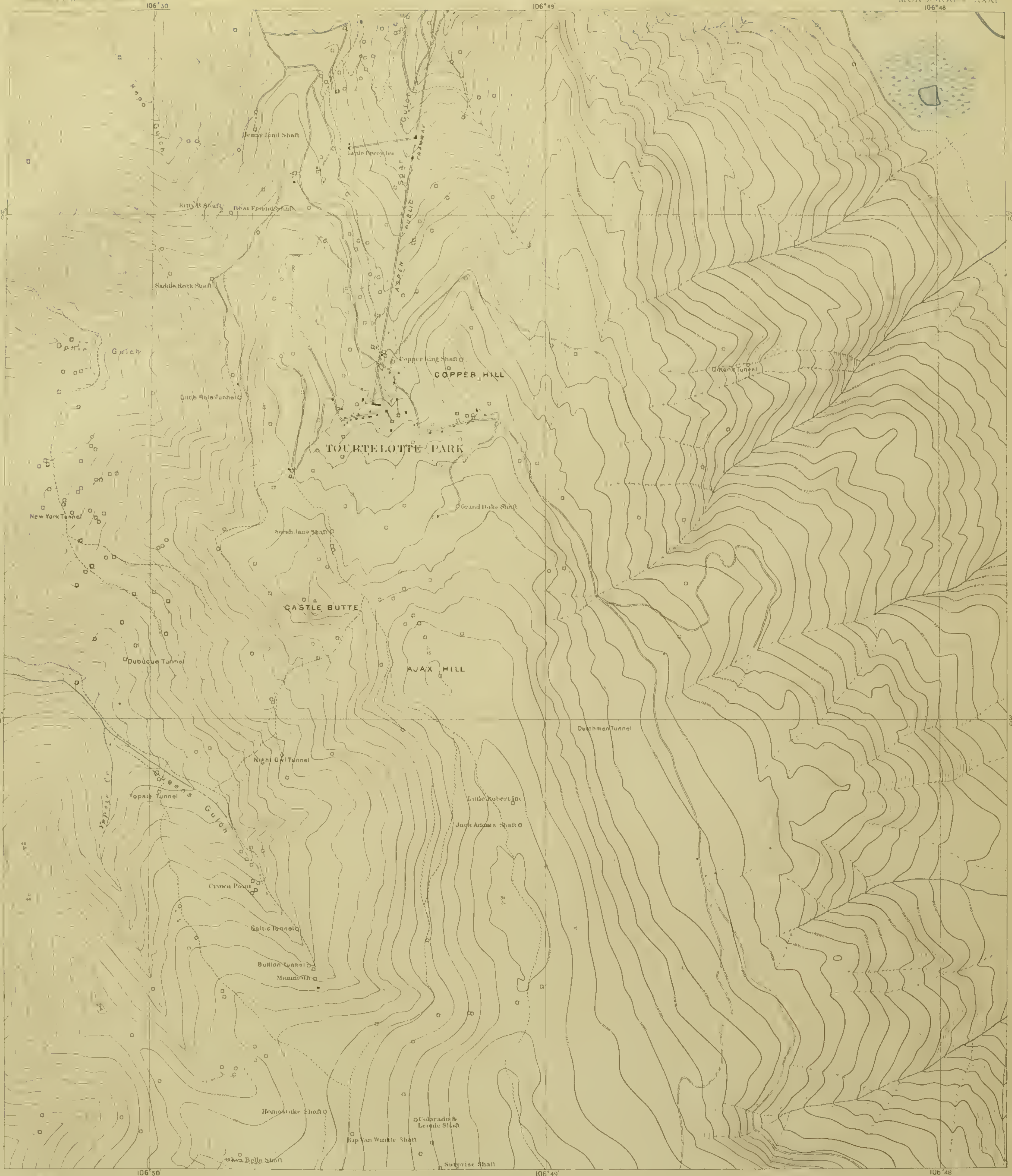
ASPEN SPECIAL SHEET

LEGEND

SUPERFICIAL	SEDIMENTARY							IGNEOUS		
PLEISTOCENE	JURATRIAS	CARBONIFEROUS			DEVONIAN	SILURIAN	CAMBRIAN	CRETACEOUS		ARCHEAN
☐	▨	▥	▨	▤	▨	▤	▨	▨	■	▨
GLACIAL DRIFT	TRIASSIC	MAROON FORMATION	WEBER FORMATION	LEADVILLE FORMATION	PARTING QUARTZITE	YULE FORMATION	SAWATCH FORMATION	QUARTZ PORPHYRY	DIORITE PORPHYRY	GRANITE

Horizontal and vertical Scale

SHEET XI TOPOGRAPHY



A.H. Thompson Geographer
Morris Bien Topographer in charge
Triangulation by Morris Bien
Topography by F.F. Grove
Surveyed in 1891

TOURTELOTTE PARK SPECIAL

Scale 1/9600

Contour interval 25 Feet

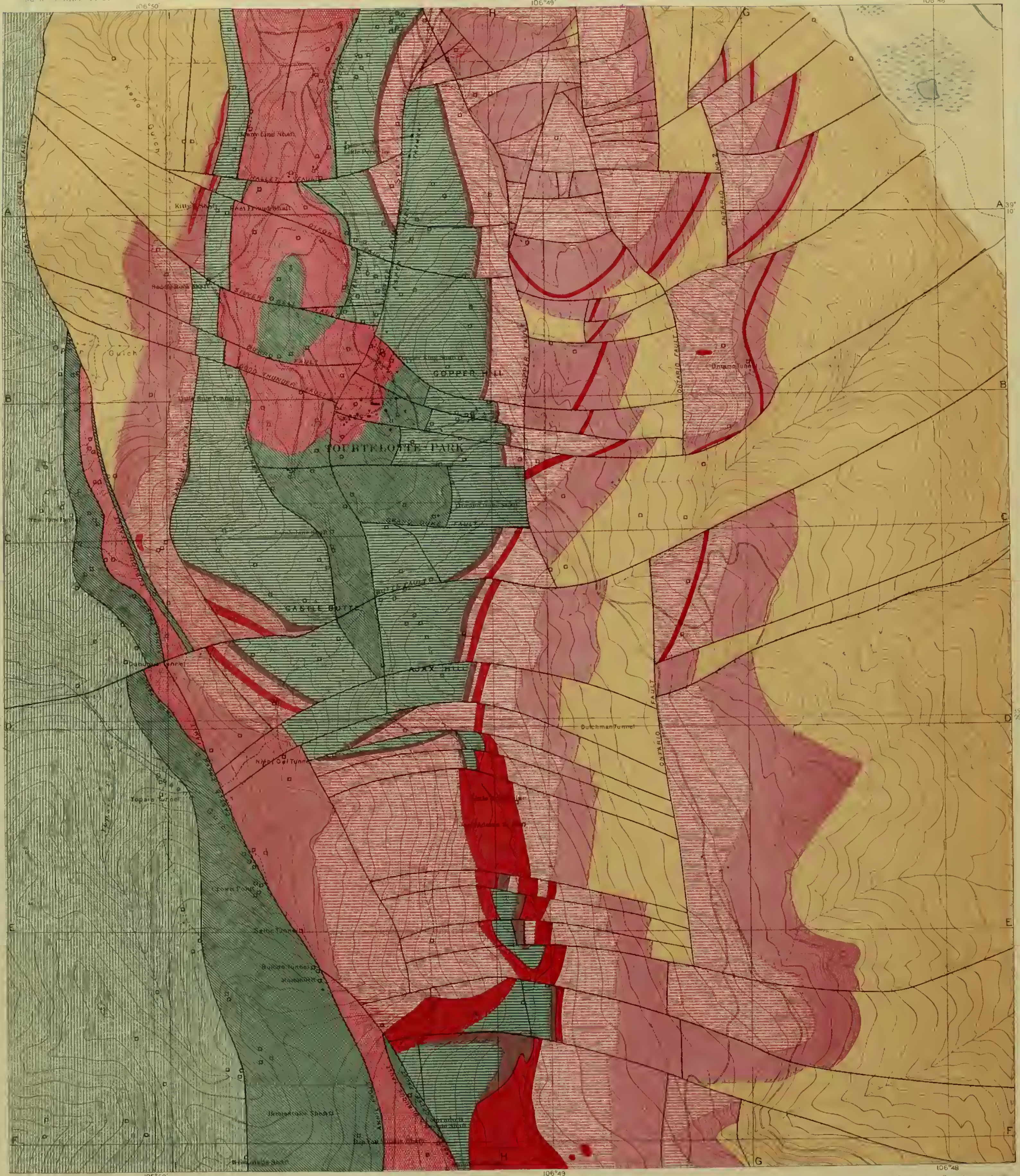
Datum is mean Sea level

JULIUS BIEN & CO. LITH. N.Y.

U.S. GEOLOGICAL SURVEY
CHARLES D. WALCOTT DIRECTOR

GEOLOGY SHEET XII

MONOGRAPH XXXI



LEGEND

SUPERFICIAL

▭ Modified glacial drift — PLEISTOCENE

SEDIMENTARY

▥ Maroon formation — CARBONIFEROUS

▨ Weber formation — CARBONIFEROUS

▤ Leadville formation — CARBONIFEROUS

■ Parting Quartzite — DEVONIAN

▤ Yule formation — SILURIAN

■ Sawatch formation — CAMBRIAN

IGNEOUS

▦ Quartz Porphyry — CRETACEOUS

■ Diorite Porphyry — CRETACEOUS

■ Granite — ARCHEAN

Note. Rectangles enclosed in dotted lines indicate areas of Tourtelotte Park Mining District sheet and of part of Aspen Mountain sheet

A.H. Thompson Geographer
Morris Bien Topographer in charge
Triangulation by Morris Bien
Topography by F.F. Grove
Surveyed in 189

TOURTELOTTE PARK SPECIAL

Scale $\frac{1}{9600}$

800 400 0 1000 1000 2000 FEET

300 100 0 200 400 600 METRES

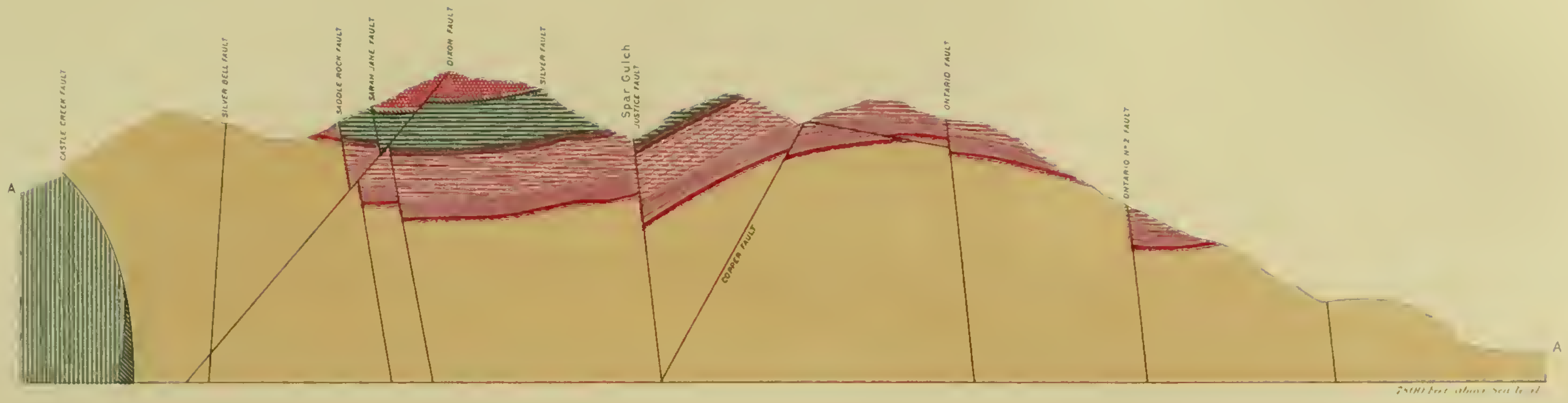
Contour interval 25 feet

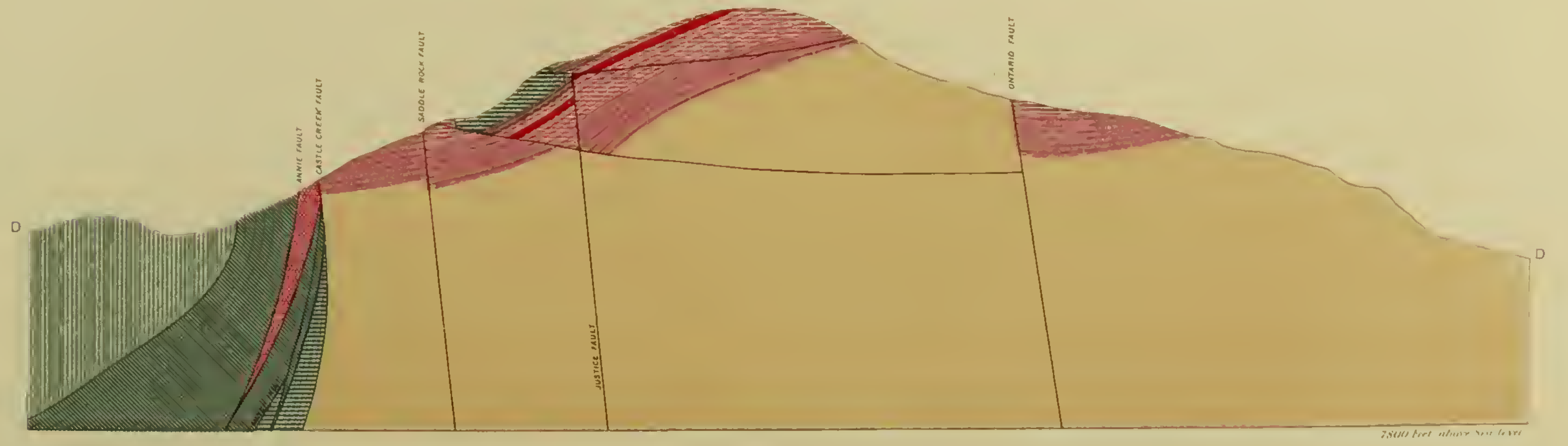
Datum is mean Sea level

JULIUS BIEN & CO. LITH. N.Y.

S.F. Emmons Geologist in charge
Geology by J.E. Spurr
Assistant G.W. Tower

SHEET XIII SECTIONS





TOURTELOTTE PARK SPECIAL SHEET

LEGEND

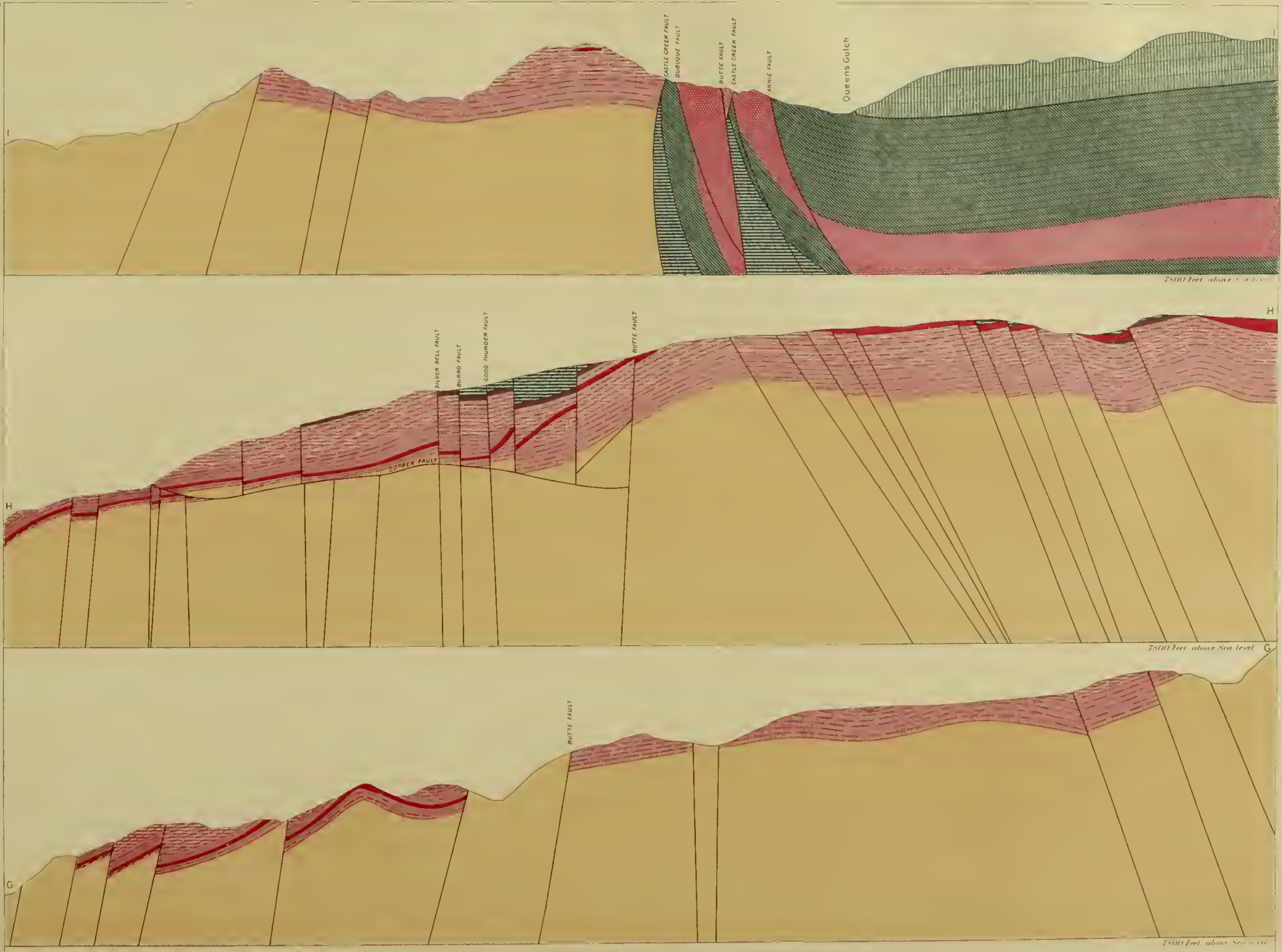
SEDIMENTARY						IGNEOUS		
CARBONIFEROUS			DEVONIAN	SILURIAN	CAMBRIAN	CRETACEOUS		ARCHEAN
▥	▨	▤	■	▤	■	▩	■	■
MAROON FORMATION	WEBER FORMATION	LEADVILLE FORMATION	PARTING QUARTZITE	YULE FORMATION	SAWATCH FORMATION	QUARTZ PORPHYRY	DIORITE PORPHYRY	GRANITE

Horizontal and vertical Scale

U S GEOLOGICAL SURVEY
CHARLES D WALCOTT DIRECTOR

SHEET XV SECTIONS

MONOGRAPH XXXI



TOURTELOTTE PARK SPECIAL SHEET

LEGEND

SEDIMENTARY

CARBONIFEROUS
- ▥ MAROON FORMATION
- ▨ WEBER FORMATION
- ▤ LEADVILLE FORMATION

DEVONIAN
- ■ PARTING QUARTZITE

SILURIAN
- ▤ YULE FORMATION

CAMBRIAN
- ■ SAWATCH FORMATION

IGNEOUS

CRETACEOUS
- ▩ QUARTZ PORPHYRY
- ■ DIORITE PORPHYRY

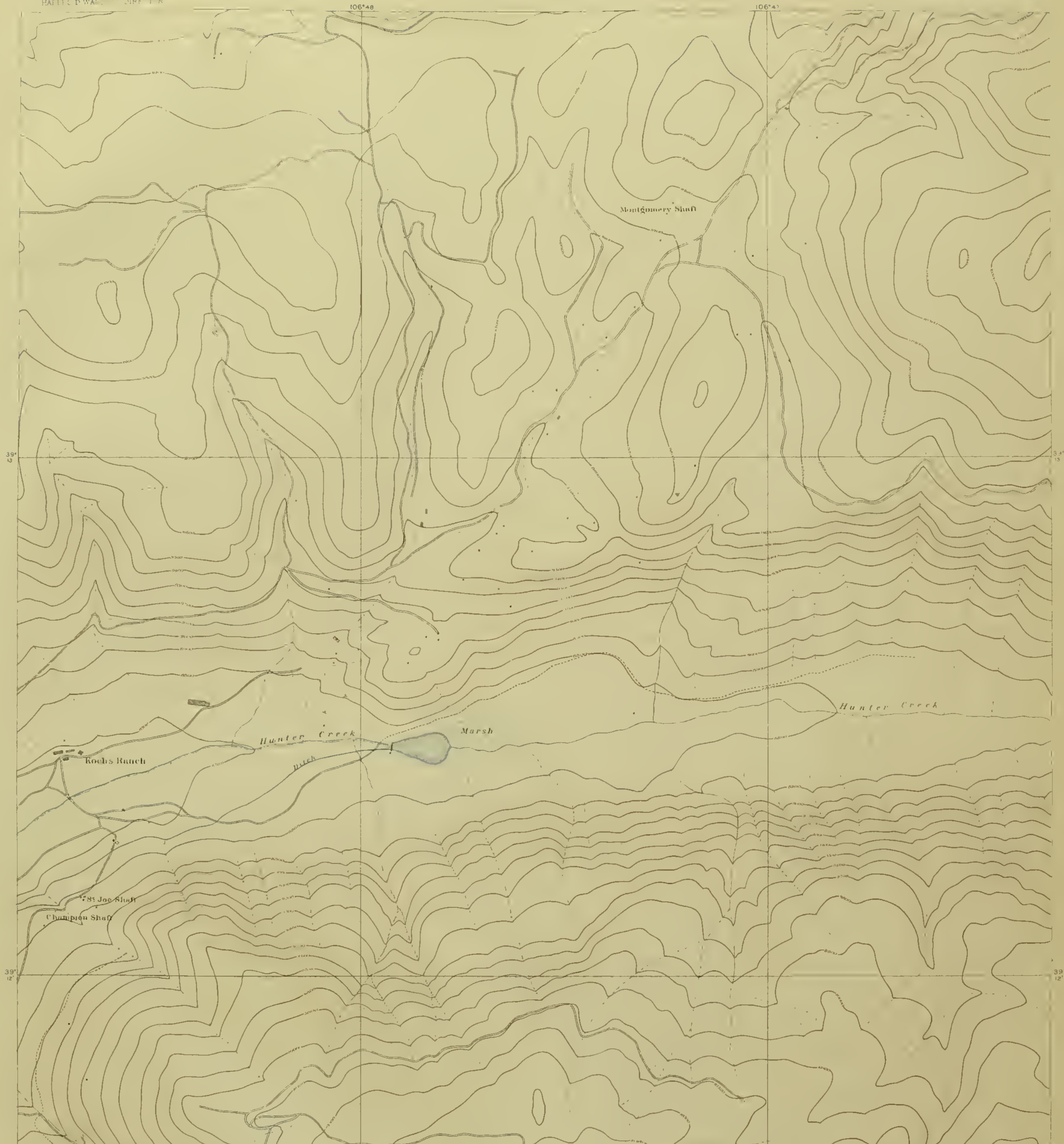
ARCHEAN
- ■ GRANITE

Horizontal and vertical Scale [illegible]

U. S. GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

SHEET XVI TOPOGRAPHY

MONOGRAPH XXXI



A. H. Thompson Geographer
F. M. Douglas Topographer in charge
Triangulation by E. M. Douglas
Topography by R. C. McKinney
Surveyed in 1893

HUNTER PARK SPECIAL SHEET

Scale $\frac{1}{9600}$

FEET

200 100 0 200 400 600 METRES

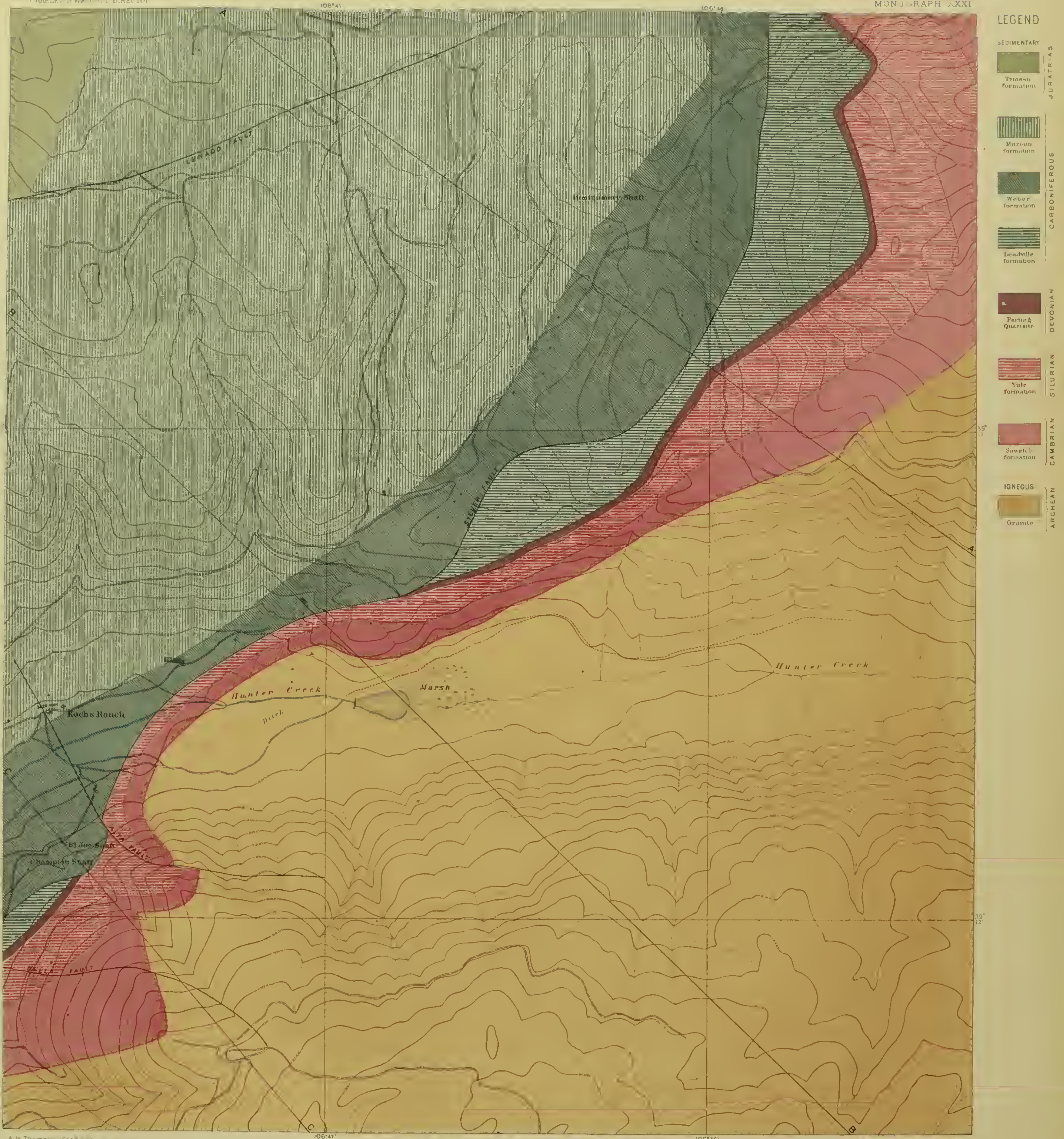
Contour interval 25 feet

Datum is mean Sea level

U. S. GEOLOGICAL SURVEY
CHARLES D WALCOTT DIRECTOR

GEOLOGY SHEET XVII

MONOGRAPH XXXI



A H Thompson Geographer
F M Douglas Topographer in charge
Triangulation by Morris Bien
Topography by
Surveyed in 1893

S F Emmons, Geologist in charge
Geology by J E Spurr
Assistant, G W Tower

HUNTER PARK SPECIAL SHEET

Scale $\frac{1}{9600}$

800 400 0 800 1600 2400 FEET

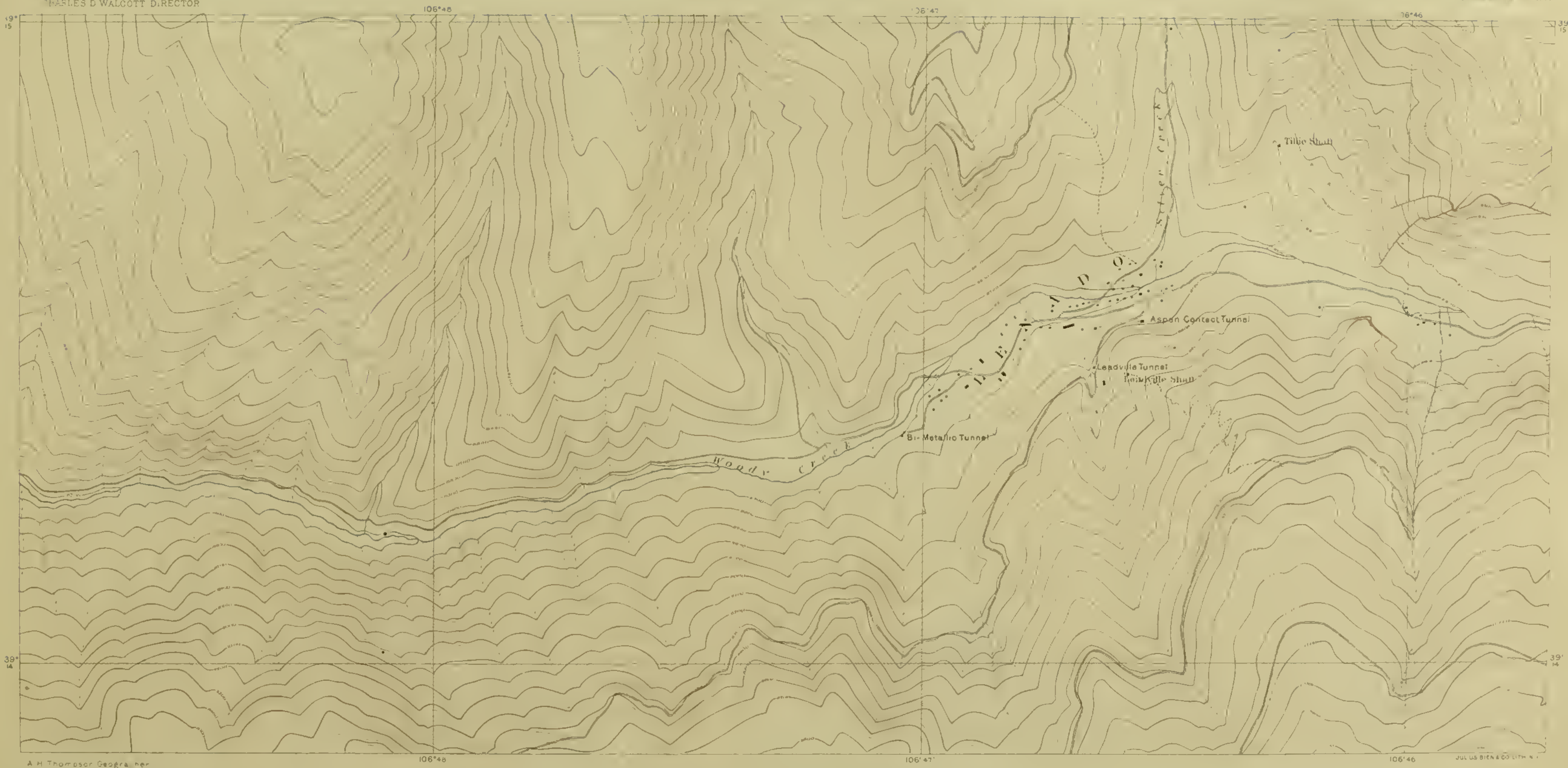
200 100 0 200 400 600 METRES

Contour interval 25 feet

Datum is mean Sea level

JULIUS BIEN & CO LITH N Y

SHEET XIX TOPOGRAPHY



A. H. Thompson Geographer
F. M. Douglas Topographer in charge
Triangulation by F. M. Douglas
Topography by W. B. Gorse and R. H. Chapman
Surveyed in 1893

LENADO SPECIAL SHEET

Scale $\frac{1}{9600}$

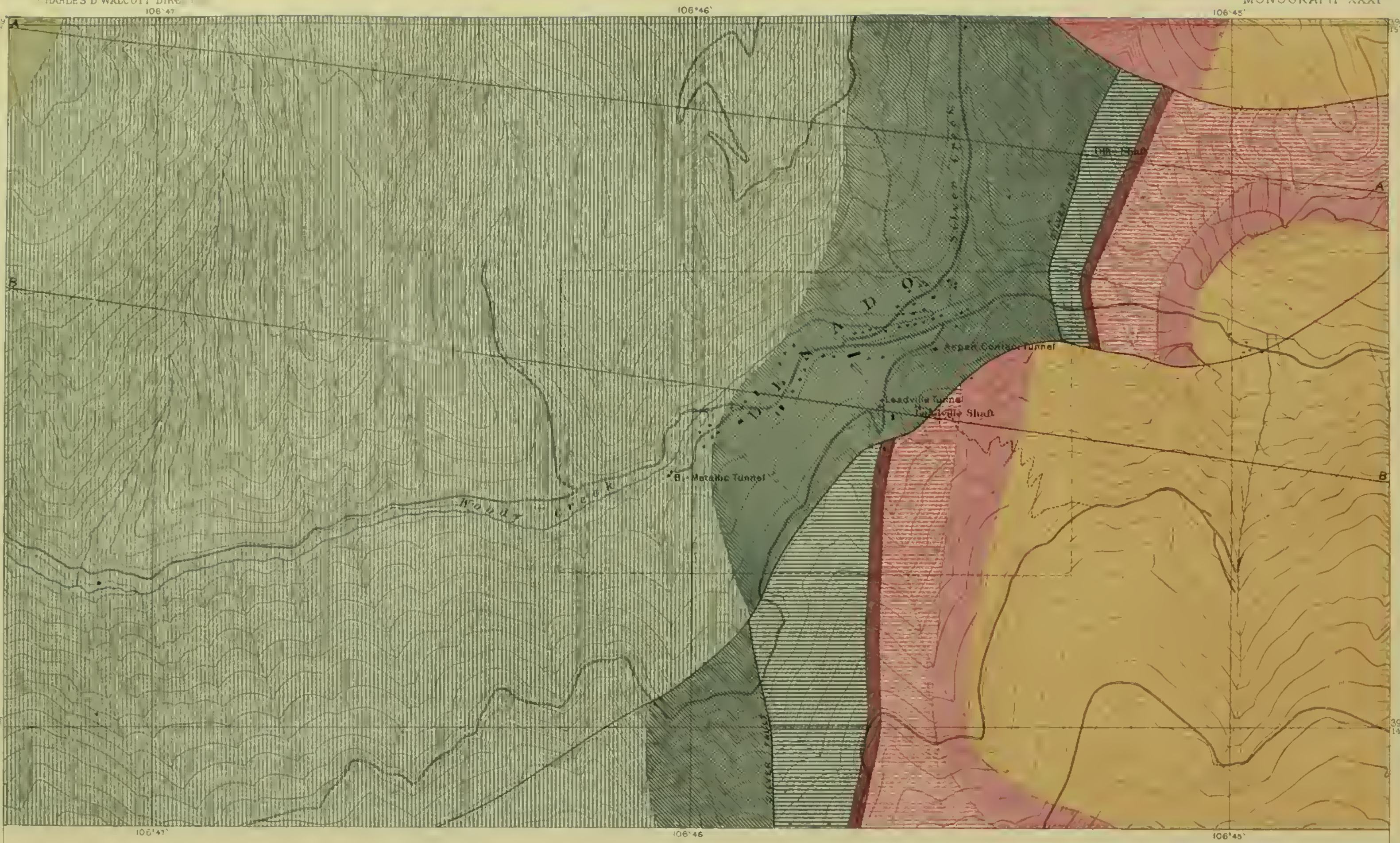
Contour interval 25 feet

Datum is mean Sea level

U. S. GEOLOGICAL SURVEY
CHARLES D WALCOTT DIRECTOR

GEOLOGY SHEET XX

MONOGRAPH XXXI



LEGEND

SEDIMENTARY

JURATRIAS
- ▨ Triassic formation

CARBONIFEROUS
- ▥ Maroon formation
- ▧ Weber formation
- ▤ Leadville formation

DEVONIAN
- ■ Parting Quartzite

SILURIAN
- ▤ Yule formation

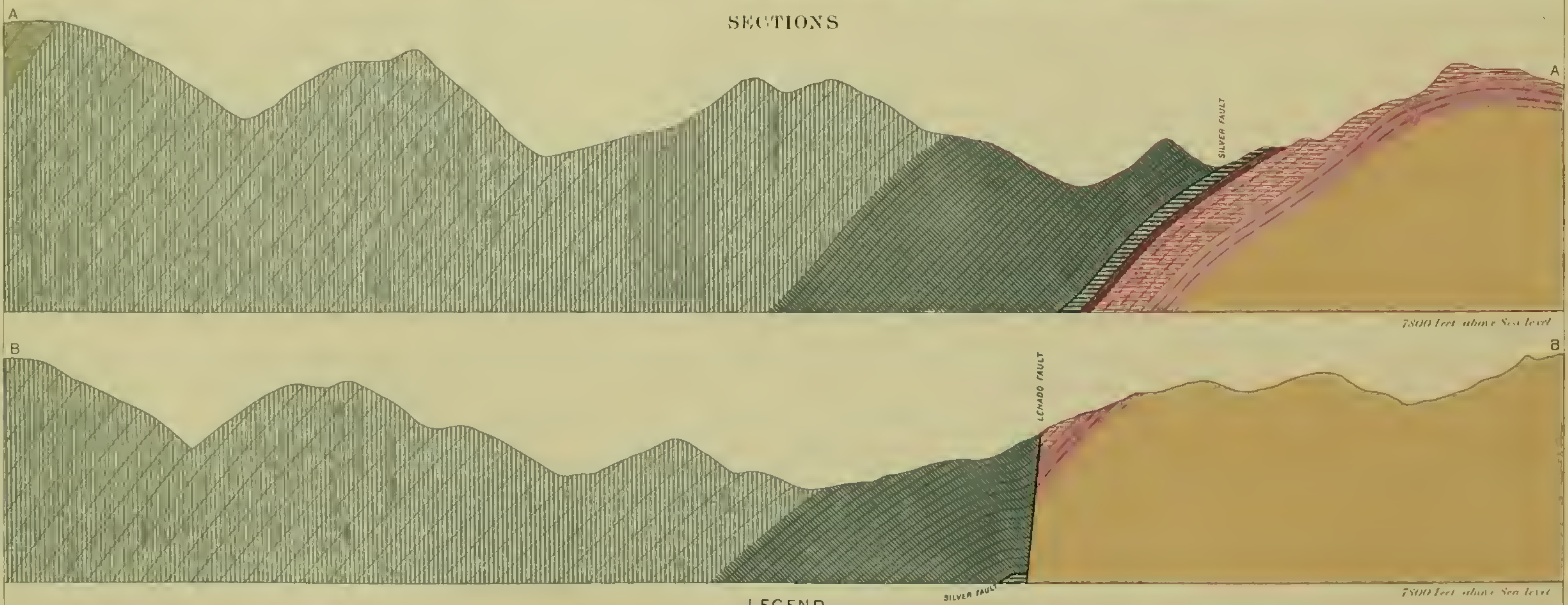
CAMBRIAN
- ■ Sawatch formation

IGNEOUS

ARCHEAN
- ■ Granite

Note. Dotted lines enclosing squares indicate area of Lenado Mining District Sheet

SECTIONS



LEGEND

SEDIMENTARY

JURATRIAS	CARBONIFEROUS			DEVONIAN	SILURIAN	CAMBRIAN	ARCHEAN
▨	▥	▧	▤	■	▤	■	■
TRIASSIC FORMATION	MAROON FORMATION	WEBER FORMATION	LEADVILLE FORMATION	PARTING QUARTZITE	YULE FORMATION	SAWATCH FORMATION	GRANITE

IGNEOUS

[illegible]
[illegible] Topographer [illegible]
[illegible] Mo[illegible]
[illegible] Chapman
[illegible] 189[illegible]

LENADO SPECIAL SHEET

Horizontal and vertical Scale $\frac{1}{9600}$

800 400 0 800 1600 2400 FEET

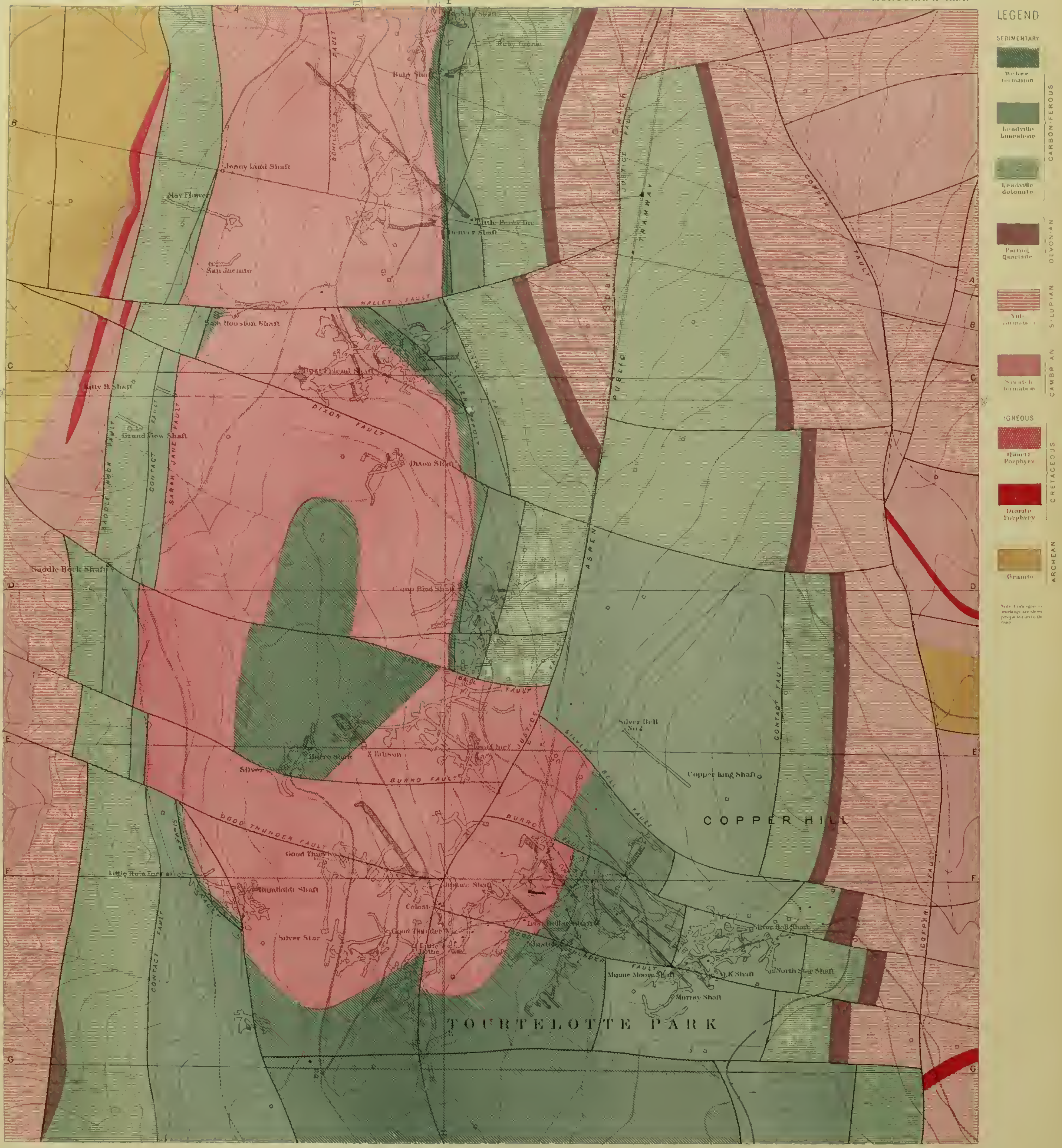
200 100 0 200 400 600 METRES

Contour interval 25 feet

Datum is mean Sea level

JULIUS BIEN & CO LITH N

S F Emmons, Geologist in charge
Geology by J E Spurr
Assistant, G W Tower



A. H. Thompson Geographer
Morris Bien Topographer in charge
Triangulation by Morris Bien
Topography by F. F. Grove
Surveyed in 189

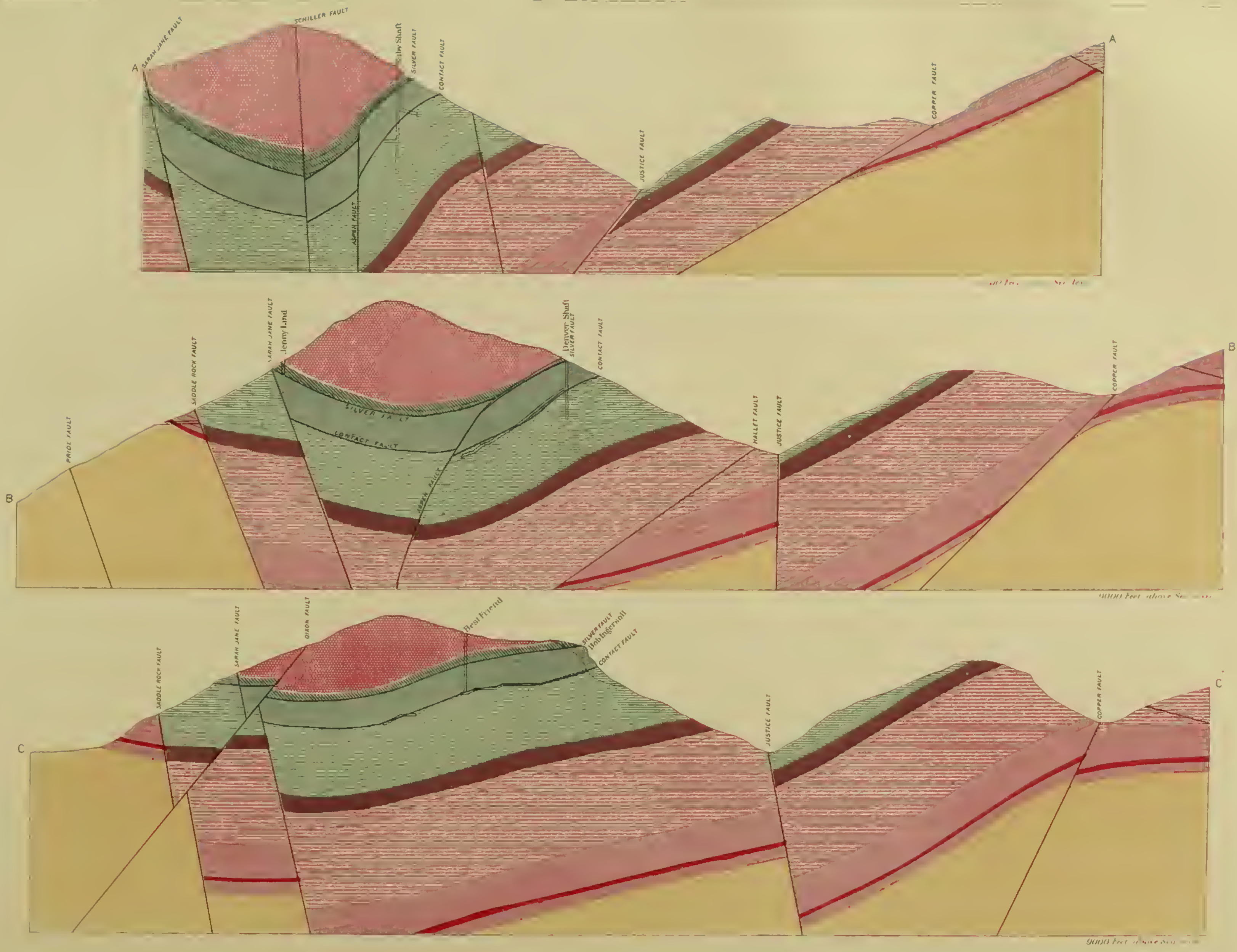
TOURTELOTTE PARK MINING DISTRICT SHEET

S. F. Emmons Geologist in charge
Geology by J. E. Spurr
Assistant G. W. Tower

Contour interval 25 feet

Datum is mean Sea level

SHEET XXII SECTIONS



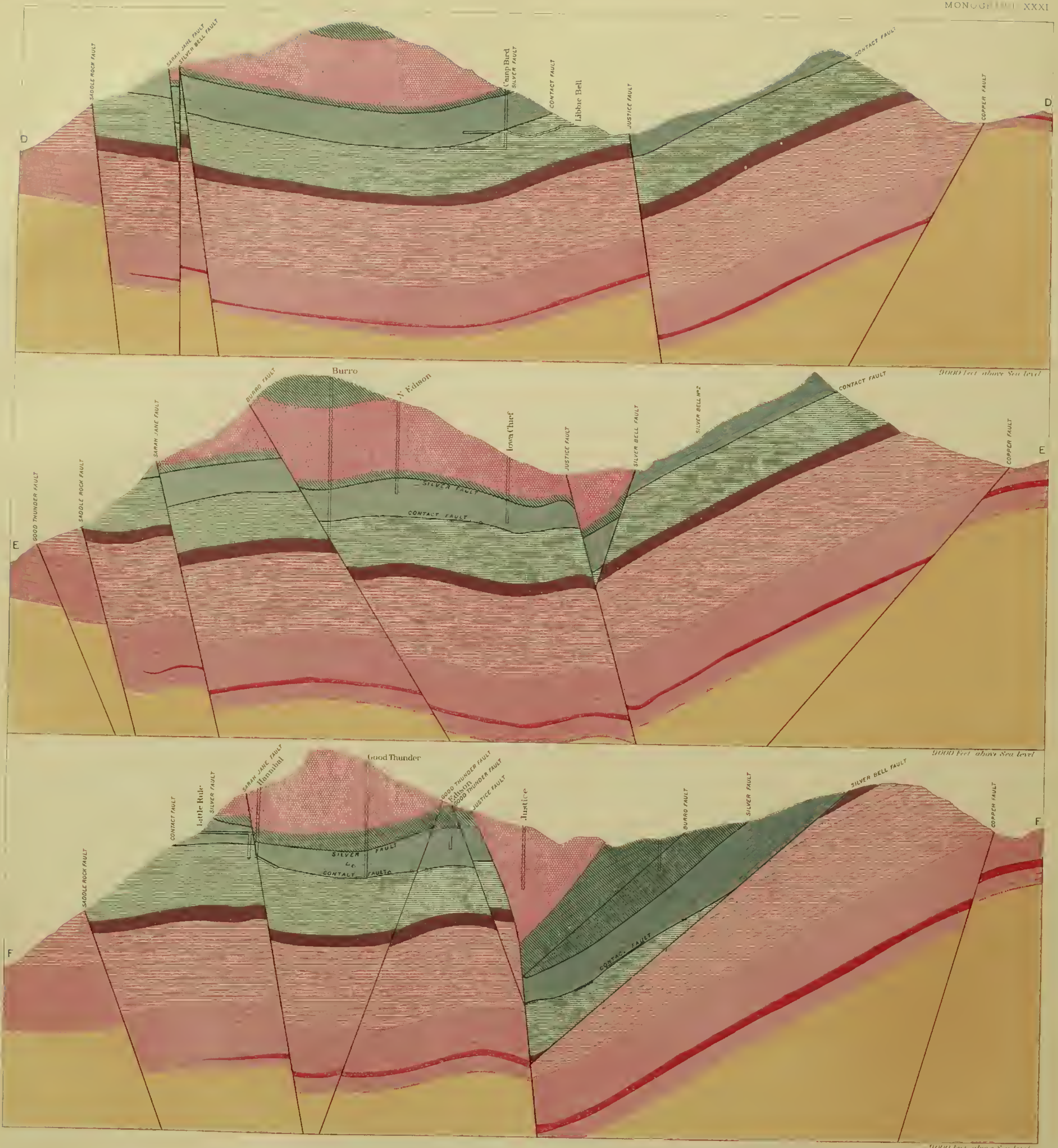
TOURTELOTTE PARK MINING DISTRICT SHEET

LEGEND

SEDIMENTARY						IGNEOUS		
CARBONIFEROUS			DEVONIAN	SILURIAN	CAMBRIAN	CRETACEOUS		ARCHEAN
▨	■	■	■	▤	■	▩	■	■
WEBER FORMATION	LEADVILLE LIMESTONE	LEADVILLE DOLOMITE	PARTING QUARTZITE	YULE FORMATION	SAWATCH FORMATION	QUARTZ PORPHYRY	DIORITE PORPHYRY	GRANITE

Horizontal and vertical Scale $\frac{1}{3600}$

SHEET XXIII SECTIONS



TOURTELOTTE PARK MINING DISTRICT SHEET

LEGEND

SEDIMENTARY						IGNEOUS		
CARBONIFEROUS			DEVONIAN	SILURIAN	CAMBRIAN	CRETACEOUS		ARCHEAN
▨	■	▤	■	▤	■	▦	■	■
WEBER FORMATION	LEADVILLE LIMESTONE	LEADVILLE DOLOMITE	PARTING QUARTZITE	YULE FORMATION	SAWATCH FORMATION	QUARTZ PORPHYRY	DIORITE PORPHYRY	GRANITE

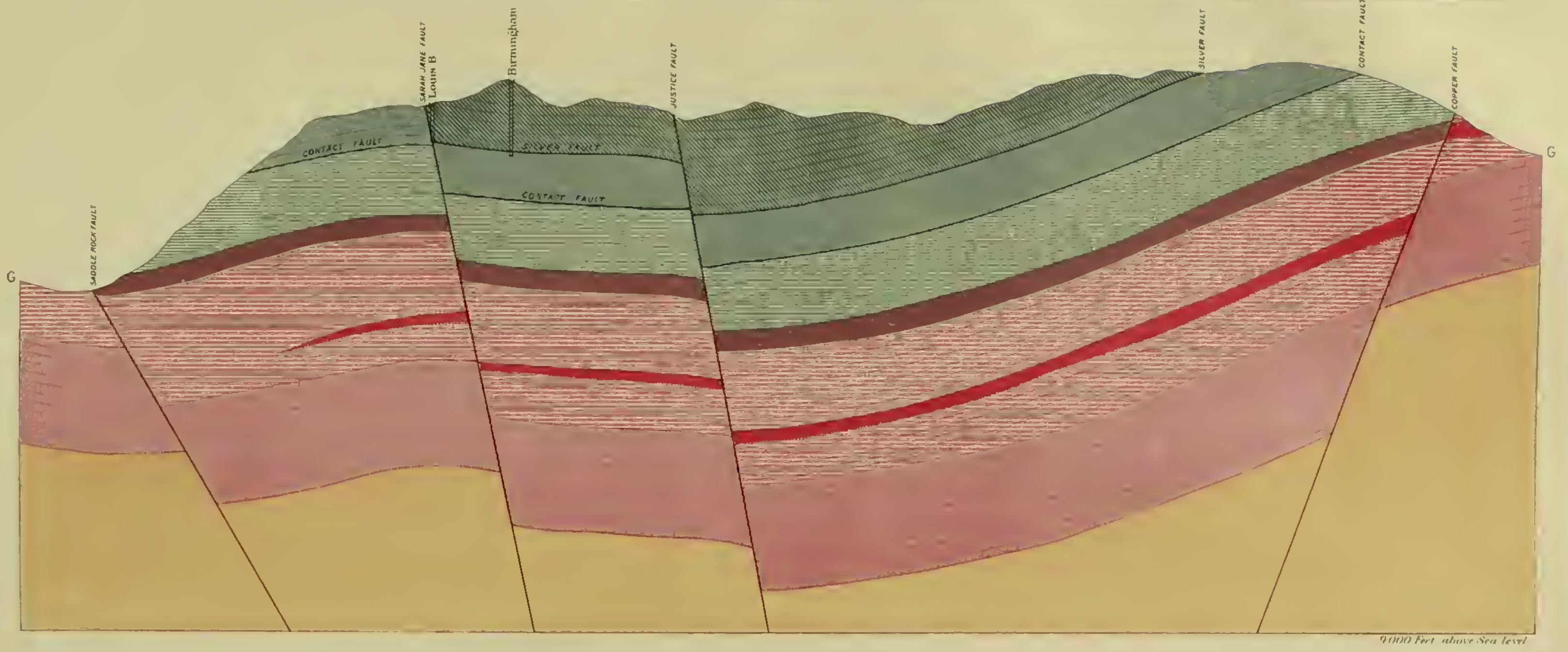
Horizontal and vertical Scale [illegible]

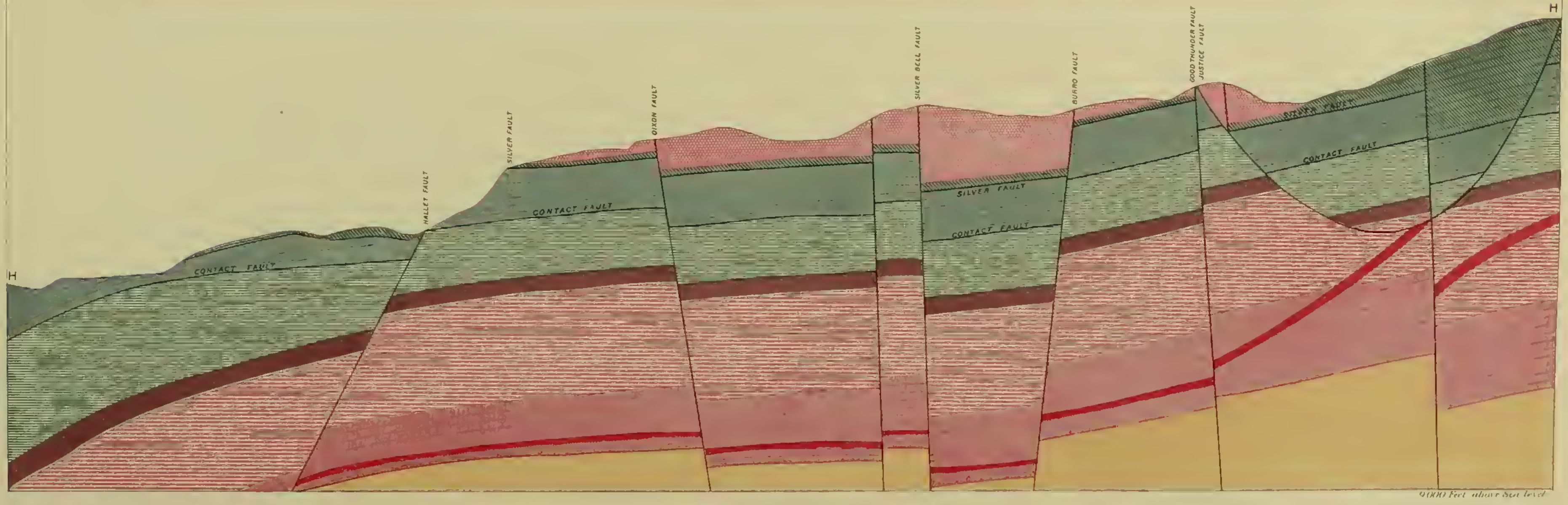
[illegible] 0 [illegible] 2000 FEET

[illegible] 500 METRES

JULIUS BIEN & CO. LITH. N.Y.

SHEET XXIV SECTIONS





TOURTELOTTE PARK MINING DISTRICT SHEET

LEGEND

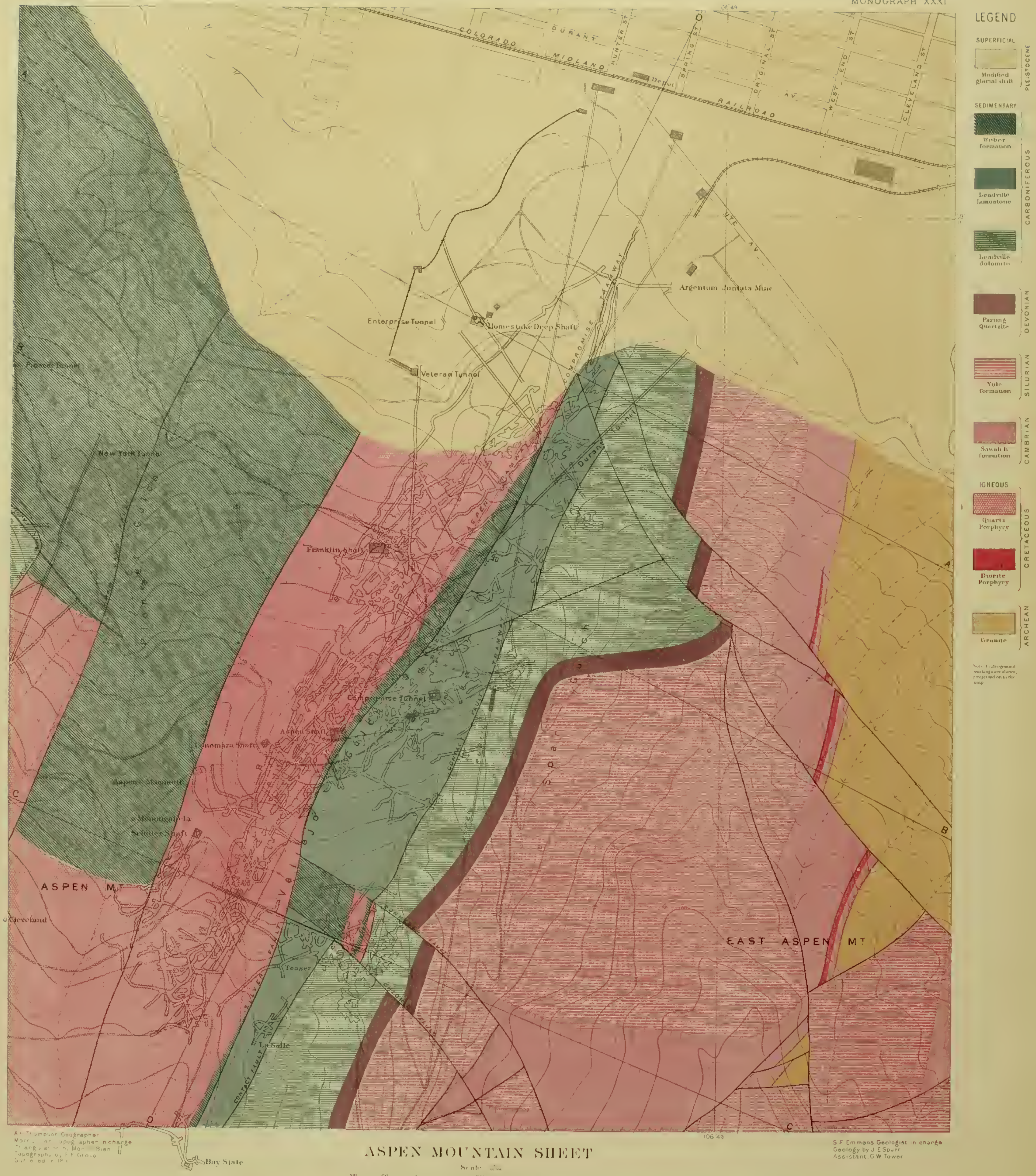
SEDIMENTARY						IGNEOUS		
CARBONIFEROUS			DEVONIAN	SILURIAN	CAMBRIAN	CRETACEOUS		ARCHEAN
▨	■	▤	■	▤	■	▩	■	■
WEBER FORMATION	LEADVILLE LIMESTONE	LEADVILLE DOLOMITE	PARTING QUARTZITE	YULE FORMATION	SAWATCH FORMATION	QUARTZ PORPHYRY	DIORITE PORPHYRY	GRANITE

Horizontal and vertical Scale [illegible]

300 225 150 75 0 300 600 900 FEET

100 0 100 200 METRES

JULIUS BIEN & Co. LITH. N.Y.



A H Thompson Geographer
Morr[illegible] Topographer in charge
Triangulation by Mor[illegible] Bien
Topography by F F Grove
Surveyed in 18[illegible]

ASPEN MOUNTAIN SHEET

Scale [illegible]

Contour interval 25 Feet

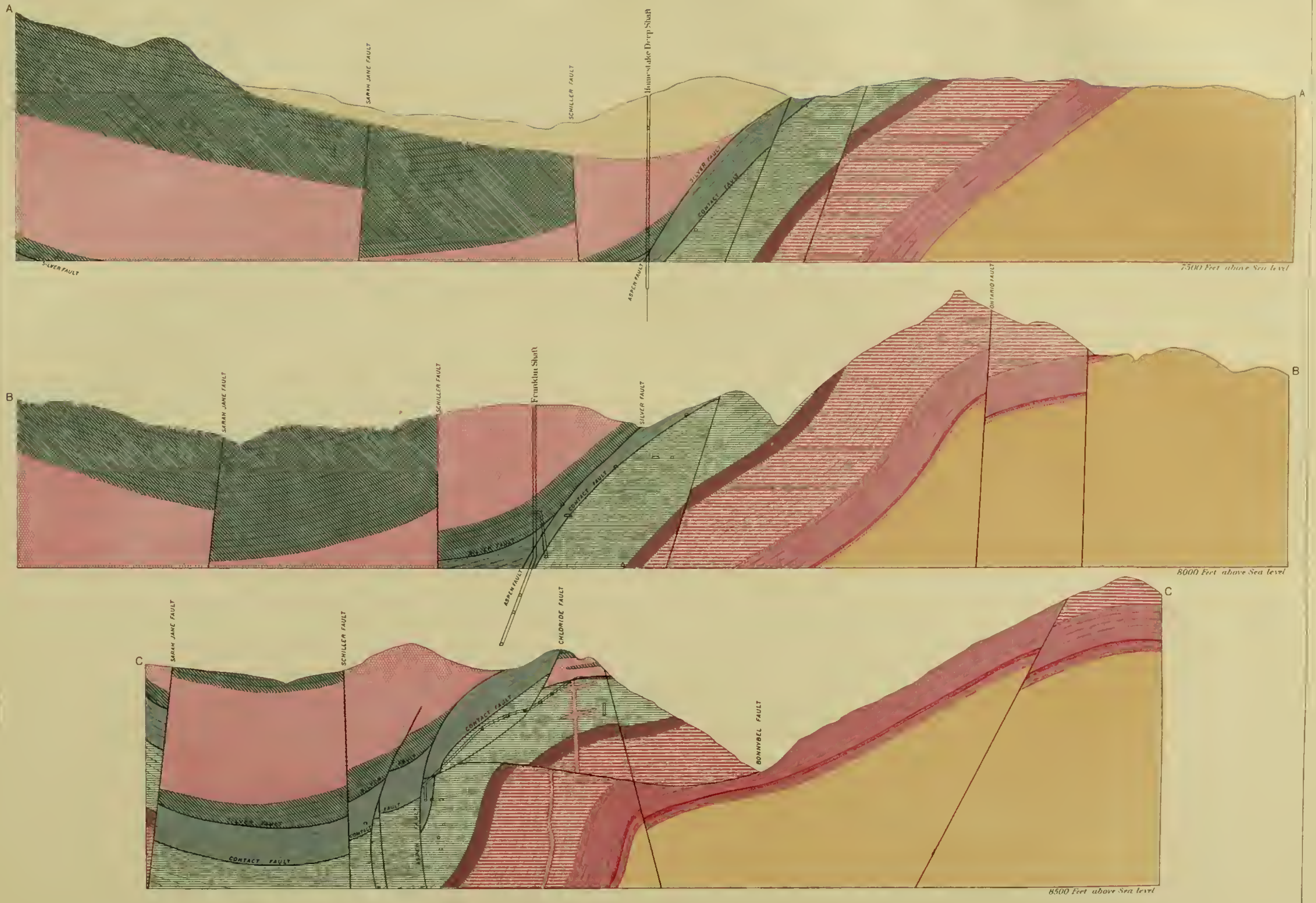
Datum is mean Sea level

S F Emmons Geologist in charge
Geology by J E Spurr
Assistant, G W Tower

U S GEOLOGICAL SURVEY
CHARLES D WALCOTT DIRECTOR

SHEET XXVI SECTIONS

MONOGRAPH XXXI



ASPEN MOUNTAIN SHEET

LEGEND

SUPERFICIAL
- PLEISTOCENE
  - GLACIAL DRIFT

SEDIMENTARY
- CARBONIFEROUS
  - WEBER FORMATION
  - LEADVILLE LIMESTONE
  - LEADVILLE DOLOMITE
- DEVONIAN
  - PARTING QUARTZITE
- SILURIAN
  - YULE FORMATION
- CAMBRIAN
  - SAWATCH FORMATION

IGNEOUS
- CRETACEOUS
  - QUARTZ PORPHYRY
  - DIORITE PORPHYRY
- ARCHEAN
  - GRANITE

Horizontal and vertical Scale: [illegible]

300 225 150 75 0 300 600 900 FEET

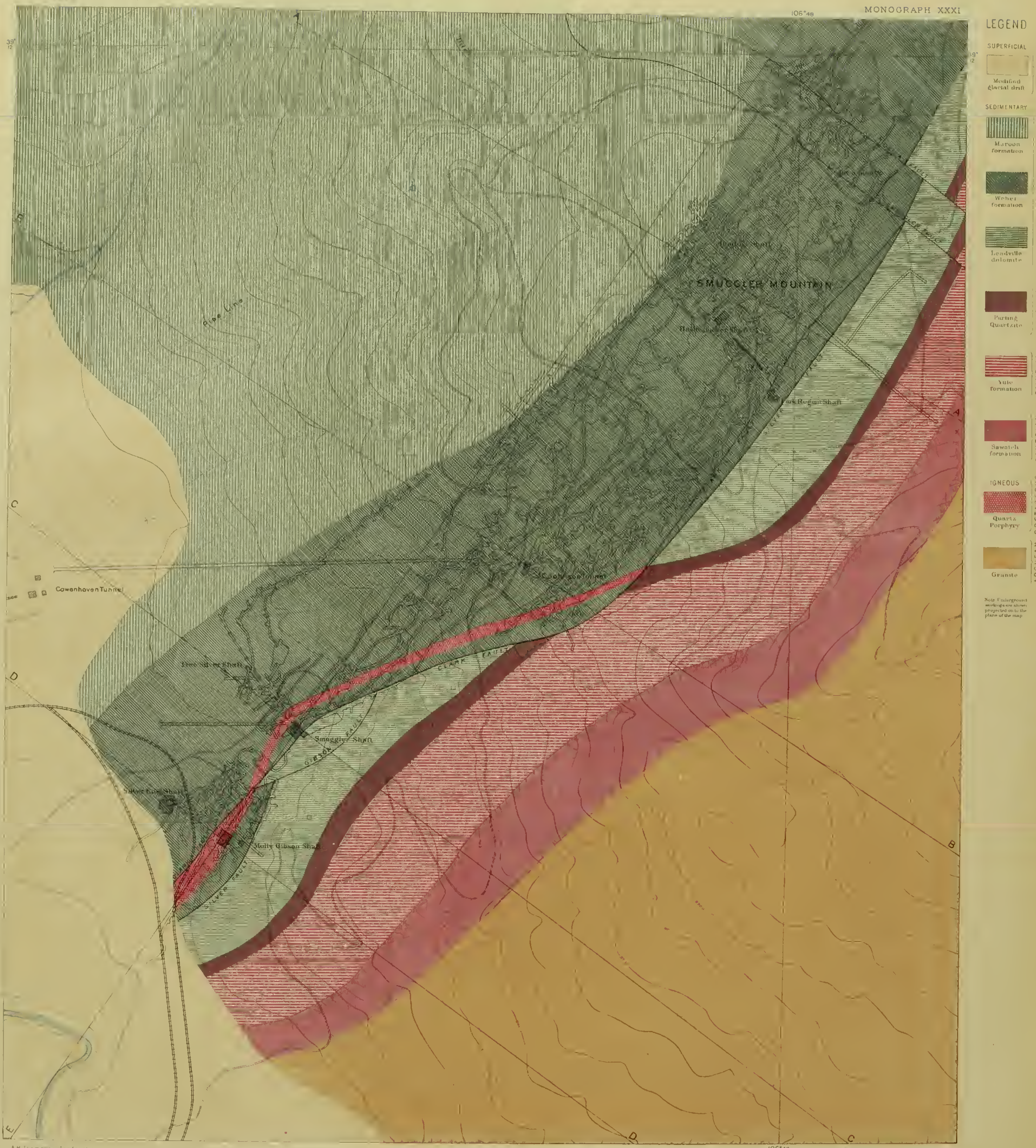
100 0 100 200 METRES

JULIUS BIEN & CO LITH N Y

U S GEOLOGICAL SURVEY
CHARLES D WALCOTT DIRECTOR

GEOLOGY AND TOPOGRAPHY SHEET XXVII

MONOGRAPH XXXI



A H Thompson Geographer
[illegible] Topographer in charge
Triangulation by Morris Bien
Topographer, F F Grove
Surveyed in 1891

SMUGGLER MOUNTAIN

Scale, $\frac{1}{3600}$

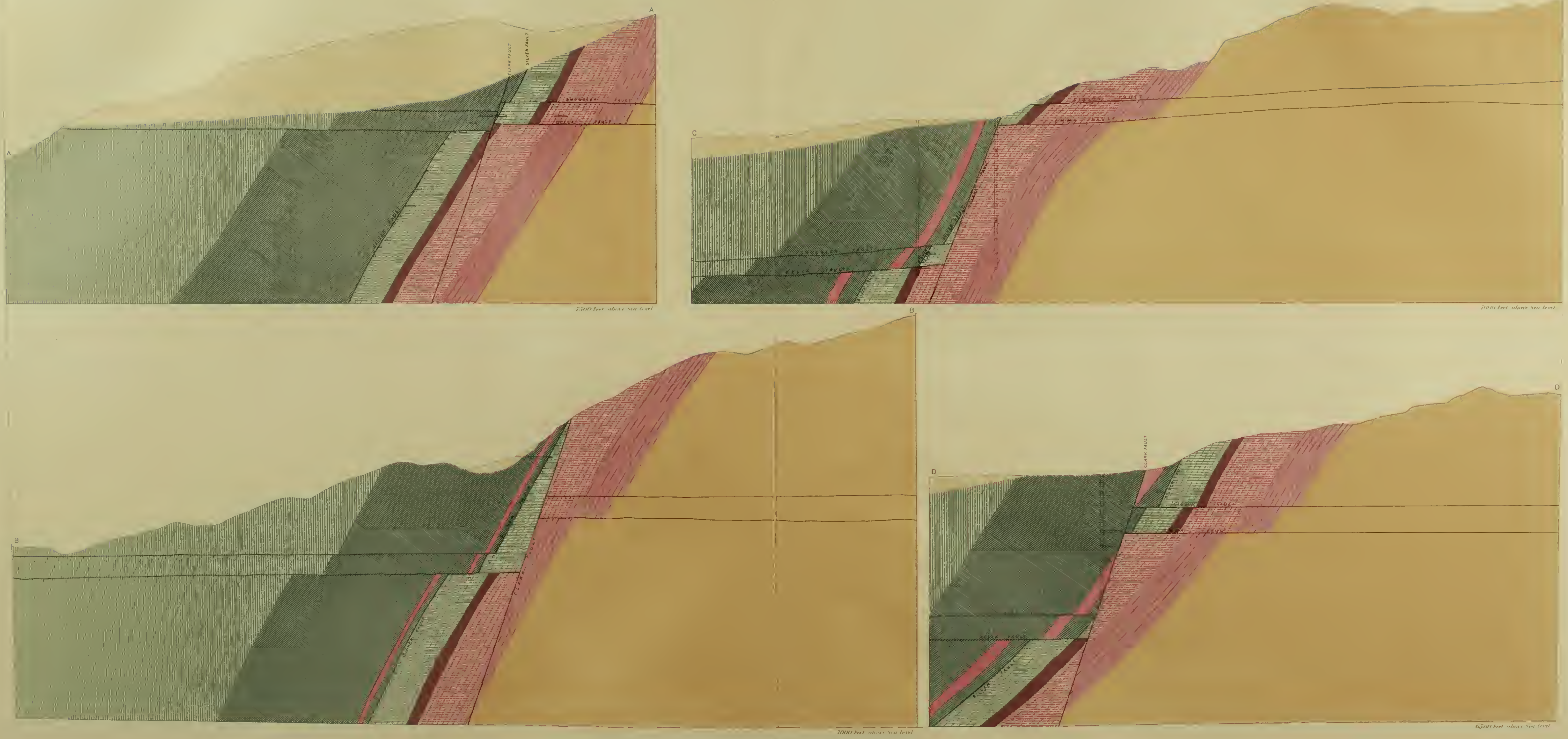
Contour interval 25 feet

Datum is mean Sea level

JULIUS BIEN & CO LITH N Y

S F Emmons Geologist in charge
Geology by J E Spurr
Assistant, G W Tower

176491



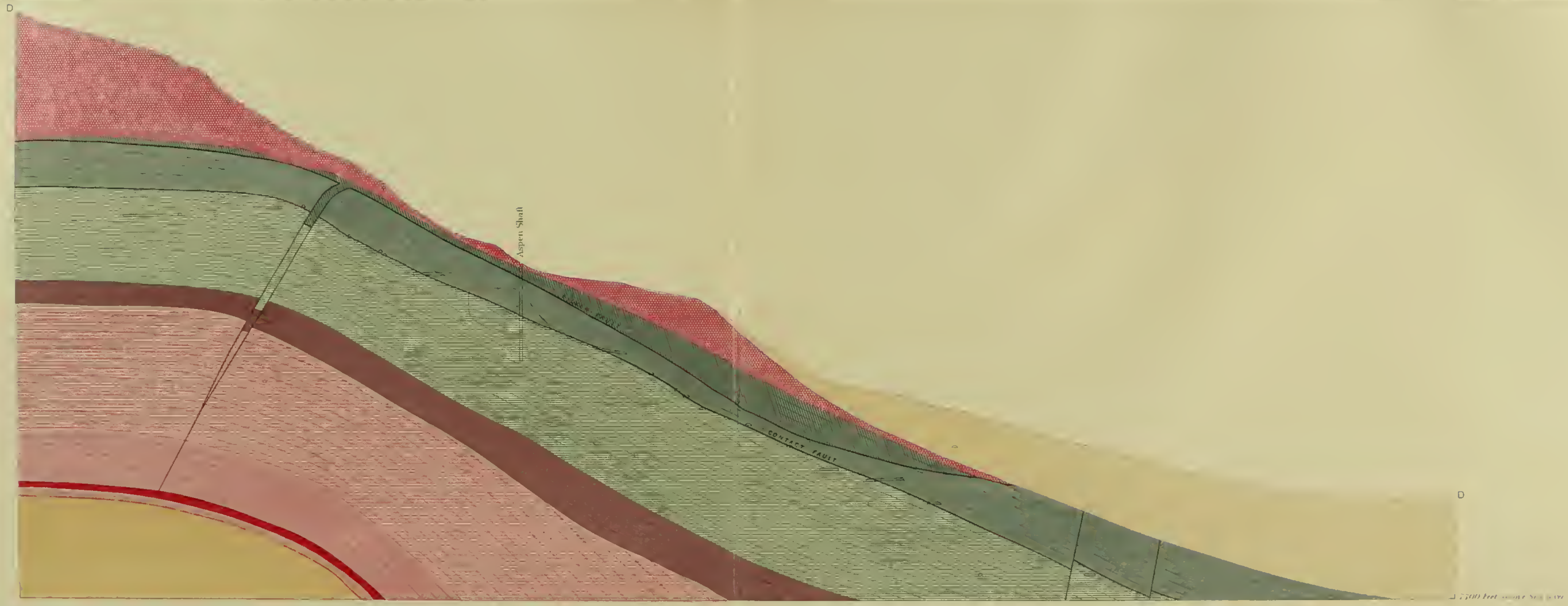
SMUGGLER MOUNTAIN SHEET

LEGEND

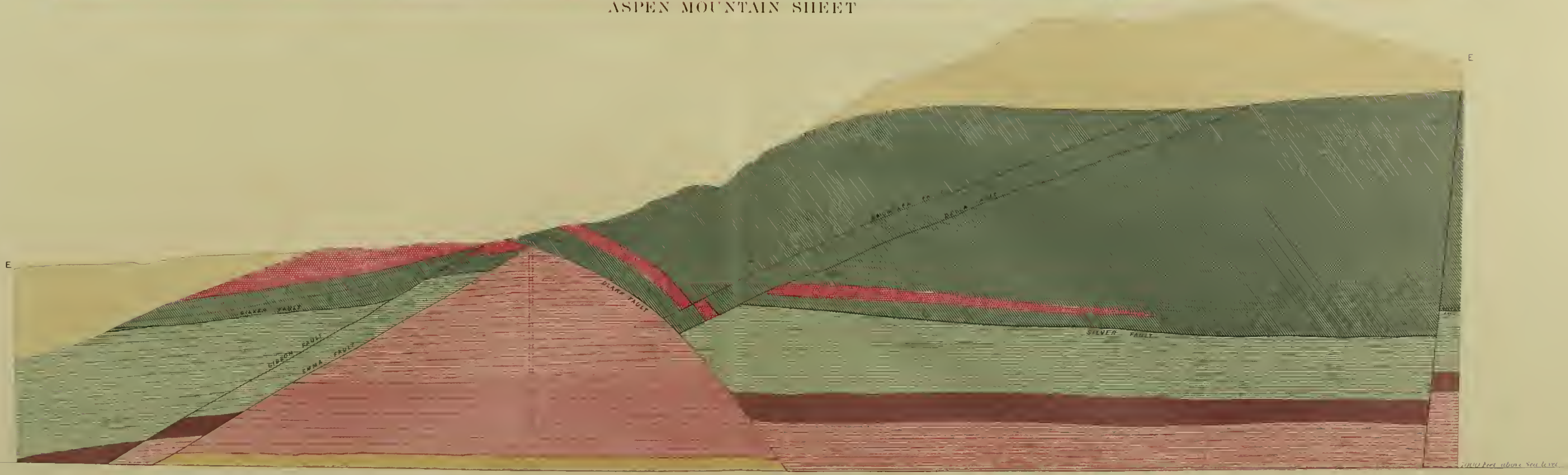
SUPERFICIAL	SEDIMENTARY						IGNEOUS	
PLEISTOCENE	CARBONIFEROUS			DEVONIAN	SILURIAN	CAMBRIAN	CRETACEOUS	ARCHEAN
GLACIAL DRIFT	MAROON FORMATION	WEBER FORMATION	LEADVILLE DOLOMITE	PARTING QUARTZITE	YULE FORMATION	SAWATCH FORMATION	QUARTZ PORPHYRY	GRANITE

Horizontal and Vertical Scale

SHEET XXIX SECTIONS



ASPEN MOUNTAIN SHEET



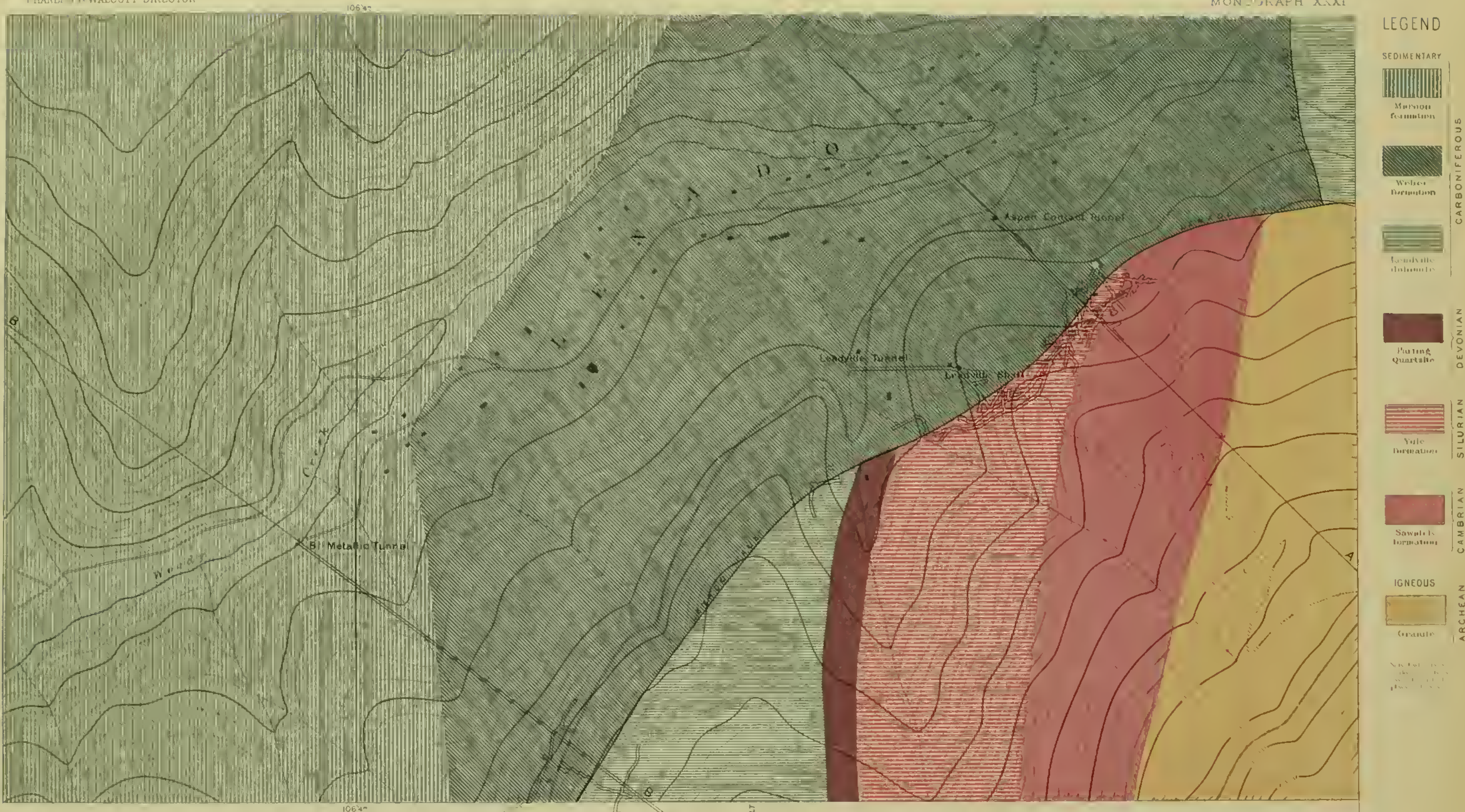
SMUGGLER MOUNTAIN SHEET

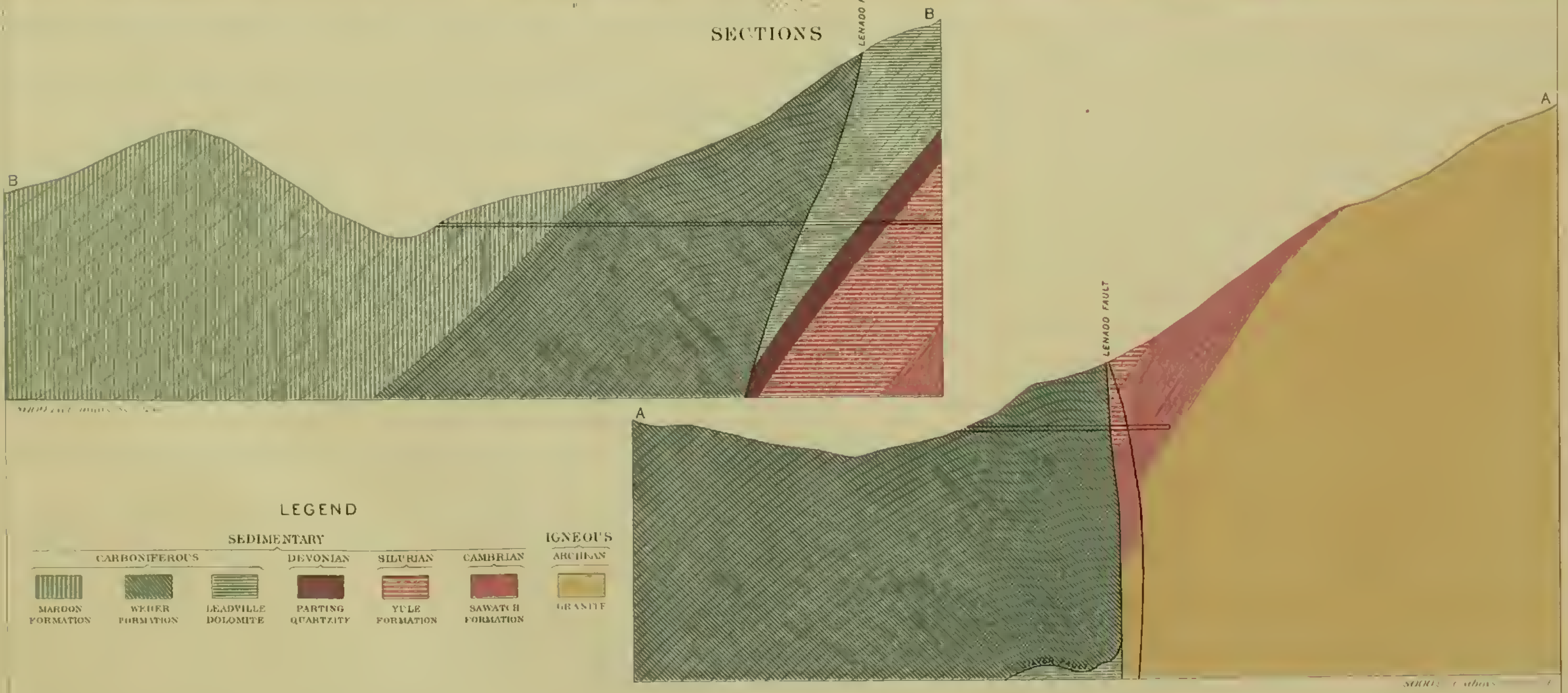
LEGEND

SUPERFICIAL	SEDIMENTARY						IGNEOUS		
PLEISTOCENE	CARBONIFEROUS			DEVONIAN	SILURIAN	CAMBRIAN	CRETACEOUS		ARCHEAN
🟨	🟩	🟩	🟩	🟫	🟥	🟥	▨	🟥	🟨
GLACIAL DRIFT	WEBER FORMATION	LEADVILLE LIMESTONE	LEADVILLE DOLOMITE	PARTING QUARTZITE	YULE FORMATION	SAWATCH FORMATION	QUARTZ PORPHYRY	DIORITE PORPHYRY	GRANITE

Horizontal and vertical Scale, [illegible]

GEOLOGY SHEET XXX





Henry Gannett Chief Geographer
Morris Bien Topographer in charge
Triangulation by Morris Bien
Topography by F F Grove
Surveyed in 1891

LENADO MINING DISTRICT

Horizontal and vertical Scale [illegible]

Contour interval 25 feet

Datum is mean Sea level

S F Emmons, Geologist in charge
Geology by J E Spurr
Assistant G W Tower

JULIUS BIEN & CO LITH N Y

Lalor

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